AMF (Allied Telesis Management Framework) Software Reference Supplement for x-Series Switches

AlliedWare Plus™ Operating System Version 5.4.3

SwitchBlade® x8112
SwitchBlade® x908

x900-24XS and x900-24XT
x900-12XT/S

x610-24Ts and x610-24Ts/X
x610-48Ts and x610-48Ts/X
x610-24Ts-PoE+ and x610-24Ts/X-PoE+
x610-48Ts-PoE+ and x610-48Ts/X-PoE+
x610-24SPs/X

AT-x510-28GTX and AT-x510-52GTX
AT-x510-28GPX and AT-x510-52GPX
AT-x510-28GSX

C613-50031-01-REV B

Allied Telesis

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Contents of this Software Reference Supplement

This document introduces AMF for Allied Telesis x-series switches. It contains the following introductory material on AMF, including links to related information.

- **Introduction to AMF** on page 5
- **How To Configure and Use AMF on Allied Telesis Switches** on page 9
- **AMF Commands** on page 49

Getting the most from this manual

Although you can view this document using Acrobat version 5, to get the best from this document, we recommend using Adobe Acrobat Reader version 8 or later. You can download Acrobat Reader free from **http://www.adobe.com/**.

Introduction to AMF

AMF, the Allied Telesis Management Framework, is a suite of network management features that simplify management of its member switches—from the network core out to its edge.

AMF simplifies switch recovery and firmware replacements and upgrades. It greatly reduces the network management and maintenance overhead.

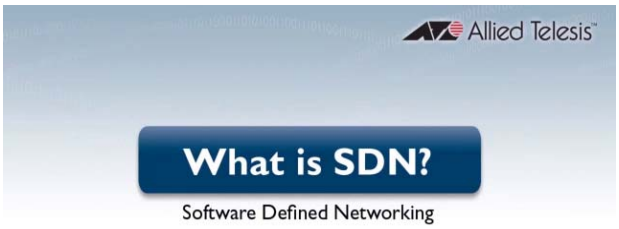
AMF Capable Products and Software

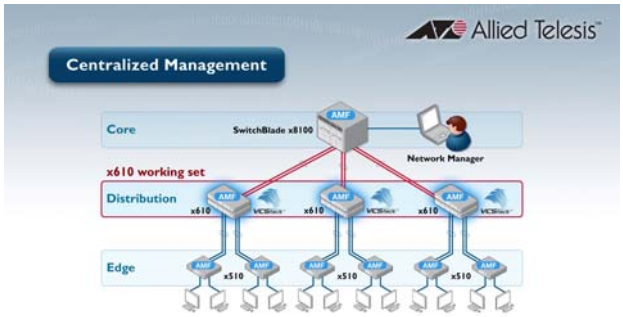
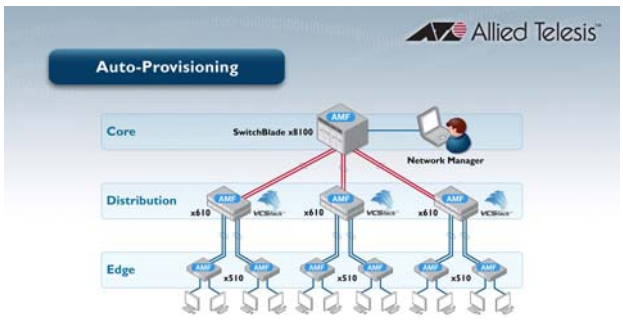
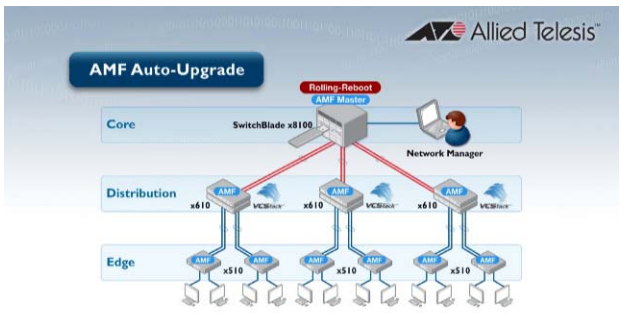
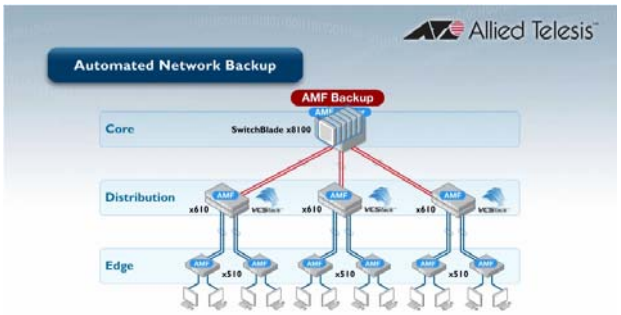
AMF is supported on the following products when running software version 5.3.4-1.4 or later:

- Switchblade™ x8100 series switches.
- Switchblade™ x908 series switches.
- x900 series switches.
- x610 series switches.
- x510 series switches.

For additional information on AMF, its configuration and its operation on Allied Telesis switches, watch the following videos from our **YouTube channel**.

AMF overview videos

Video	Topic
	*Introducing Software Defined Networking (SDN)* This video describes SDN, its key drivers, where it fits in the networking world, and what Allied Telesis has done to meet these emerging requirements. Click the following link to view the video: www.alliedtelesis.com/videos/whatissdn
	Introducing AMF This video describes AMF and how this powerful suite of management tools can automate your everyday network administration tasks. Click the following link to view the video: www.alliedtelesis.com/videos/introducingamf

Video	Topic
	*Centralized Network Management* This video shows how the management of modern complex networks can be greatly simplified with AMF. Click the following link to view the video: www.alliedtelesis.com/videos/AMFmanagement
	*Auto-provisioning* This video shows how the addition of new switches to expand the network can be automated with AMF. Click the following link to view the video: www.alliedtelesis.com/videos/AMFautoprovisioning
	*Auto-Upgrade* This video shows how upgrading a large complex network can be automated with AMF. Click the following link to view the video: www.alliedtelesis.com/videos/AMFautoupgrade
	*Auto-Backup* This video shows how network back-ups can be automated with AMF. Click the following link to view the video: www.alliedtelesis.com/videos/AMFautobackup

Video	Topic
	AMF Live Demo: Zero-Touch Auto Recovery This video shows a live demonstration of the auto-recovery feature of AMF. A network device is powered off to simulate a failure and the replacement is automatically re-configured by AMF without any user intervention. Click the following link to view the video: www.alliedtelesis.com/videos/AMFautorecovery

Technical Guide

How To | Configure and Use AMF on Allied Telesis Switches

Introduction

The Allied Telesis Management Framework (AMF) is a suite of features that combine to simplify network management across all supported network devices from the core to the edge.

AMF also provides simplified unit recovery and firmware upgrade management. The primary function of AMF is to reduce the management and maintenance overhead on a network, while improving on responsiveness and handling of device failures within the network.

What information will you find in this document?

This How To Note describes AMF along with its benefits, concepts, and configuration guidelines. For more information on the commands used in this How To note, see the **AMF Commands** chapter later included within this document. Also for those who would like to know more about AMF, see the **Introduction to AMF**.

Which products and software version does it apply to?

This How To Note applies to the following Allied Telesis switches running AlliedWare Plus OS software version ***5.4.3*** or later:

- SwitchBlade™ x8100 family
- SwitchBlade™ x908 series switches
- x900 series switches
- x610 series switches
- x510 series switches

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Software feature licensing

A feature licence is required for each AMF master node in the AMF network. AMF master node licences are available for the SBx8100 and SBx908 platforms. A licence is not required for AMF member nodes.

The key benefits of AMF

The key benefits of AMF include its: unified command-line, simple configuration backup and recovery process, and time-saving rolling firmware upgrade.

Unified command-line

The primary means of configuring and controlling AlliedWare Plus (AW+) units is via a text-based command-line interface. In existing networks, this command-line is available via a serial console port as well as remote login sessions (e.g. SSH).

Under AMF, this concept is extended to allow control of an entire network of AW+ devices (or any part thereof) via a single session. It allows a network administrator to nominate all nodes or a subset of nodes within the AMF network, known as a ***working-set***. Commands can then execute concurrently across all nodes in the nominated working-set as if it were a single unit. Any existing configuration or diagnostic actions can thus be applied to multiple devices, reducing repetitive and error-prone roll-out procedures. In this way, regularities in network design can be used to reduce maintenance cost and complexity, while still retaining complete flexibility in network design and control. Currently AMF supports a network of up to 42 nodes, and multiple AMF networks can exist side by side across a single physical network. A Virtual Chassis Stack (VCStack) is considered to be just one node by AMF.

Configuration backup and recovery

An AMF network has a **master** node that uses external storage to automatically backup complete configuration information of all the other nodes, including boot configuration, firmware, licenses, and user scripts. If a node subsequently fails, the AMF will automatically recognize and reconfigure an unconfigured replacement unit, completely recreating the stored state of the failed unit into the replacement unit. This new unit will then reboot and resume service, without any need for user intervention beyond physical hardware replacement. In this way AMF provides a complete zero-touch recovery solution.

If preferred (or if automatic recovery fails), the new hardware will be held in a safe non-forwarding state—ready for a network administrator to configure remotely via the AMF unified command-line.

Rolling firmware upgrade

Firmware upgrades on a production network are typically an infrequent but sensitive and labour-intensive process. AMF supports automated firmware roll-out to a user-selected subset of nodes. The user selects a target group of nodes, and the location where the new firmware is stored, then AMF takes care of the rest. Nodes are upgraded in a serial fashion, with each node tested before continuing with subsequent nodes.

If an upgrade fails, the upgrade process is automatically terminated and that node is reverted to the previous firmware version. In this way firmware updates are almost completely hands-free, while providing confidence that a bad update will not result in loss of service.

AMF concepts

Network name

The AMF network ***name*** is used to determine the AMF network a node belongs to. All nodes within an AMF network must be configured with the same AMF name.

Node

AMF members are commonly referred to as nodes. A node can be a single switch, or a VCStack.

Master nodes

AMF master nodes are user defined and form the core domain of the AMF network. They are:

- responsible for performing file system backups of all nodes in the AMF network.
- required before an AMF network can form; at least one must be present.

AMF master nodes are supported on SBx908 and SBx8100 platforms; an AMF licence is required for each master. Only one AMF master license is required even if two CFCs are installed. The license is for the chassis, not the CFC.

Notes: A VCStack needs to have consistent licensing on all stack members, so an AMF master license would be required on both devices in an SBx908 stack.

- When more than one AMF master node exists in an AMF network, it is important to know that these operate completely independently of each other, and there is no synchronization between AMF master nodes.
- For redundancy, you can have multiple master nodes, each acting as a master for the network. But, there is no synchronization of status or data files between the masters. The behaviour of a master node is not changed at all by the presence of other master nodes.

Domains

Every AMF node belongs to an AMF domain, which may be comprised of multiple nodes or only a single node. AMF master nodes are included in the core domain, and all other domains are rooted in the core domain. AMF domains are determined by AMF crosslinks, (see page 15). All nodes connected via AMF crosslinks are part of the same domain, and

nodes connected via regular AMF links will be part of a higher or lower domain depending on whether they are closer to or further away from the core domain. Nodes within a domain must be connected in either a chain or ring topology.

This means that a maximum of two crosslinks should be configured on any single node. The advantage of an AMF domain is that two links from a domain to a single higher level domain (closer to the core) will provide redundant AMF links. It is recommended that an AMF domain should only be connected to a single higher level domain, though it may be connected to multiple lower level domains.

It is recommended that:

- The maximum number of nodes per domain is 12 for SBx8100, x908, x900, x610, and x510.

Core distance

This is the distance (hop count) between a domain and the Core domain. The Core domain has a Core distance of 0, and the maximum recommended Core distance in an AMF network is 8.

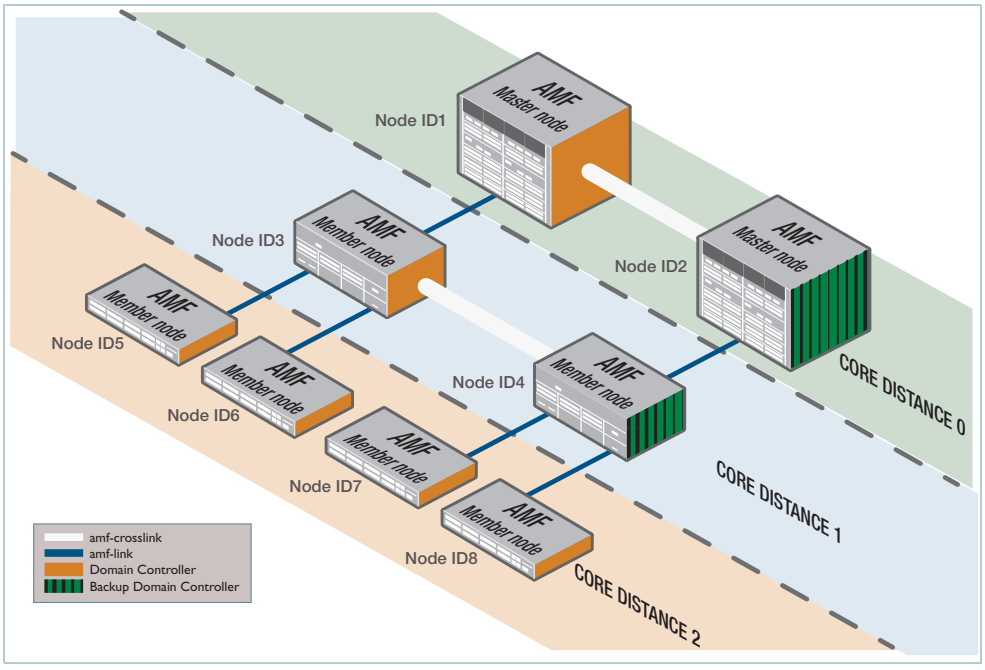

Figure 1: AMF domains and Core distance

Links

AMF links are used to connect AMF nodes to AMF nodes in other AMF domains, and are either uplinks or downlinks. Uplinks are used to connect a domain with a higher Core distance (further from the Core) to a domain with a lower Core distance (closer to the Core. Downlinks are used to connect a domain with a lower Core distance to a domain with a higher Core distance.

AMF links are used to pass AMF management traffic between nodes, but can also be used to carry other network traffic. Configuring an interface as an **atmf-link** will automatically put the port into trunk mode. An AMF link must have at least one tagged VLAN, or have a native VLAN defined. An AMF link can be either a single link or a static aggregator.

Crosslinks

AMF crosslinks are used to connect AMF nodes to other AMF nodes within the same AMF domain. AMF master nodes must be connected using AMF crosslinks to ensure they are part of the core domain. Configuring an interface as an atmf-crosslink will automatically put the port into trunk mode. A crosslink can be either a single link or a static aggregator.

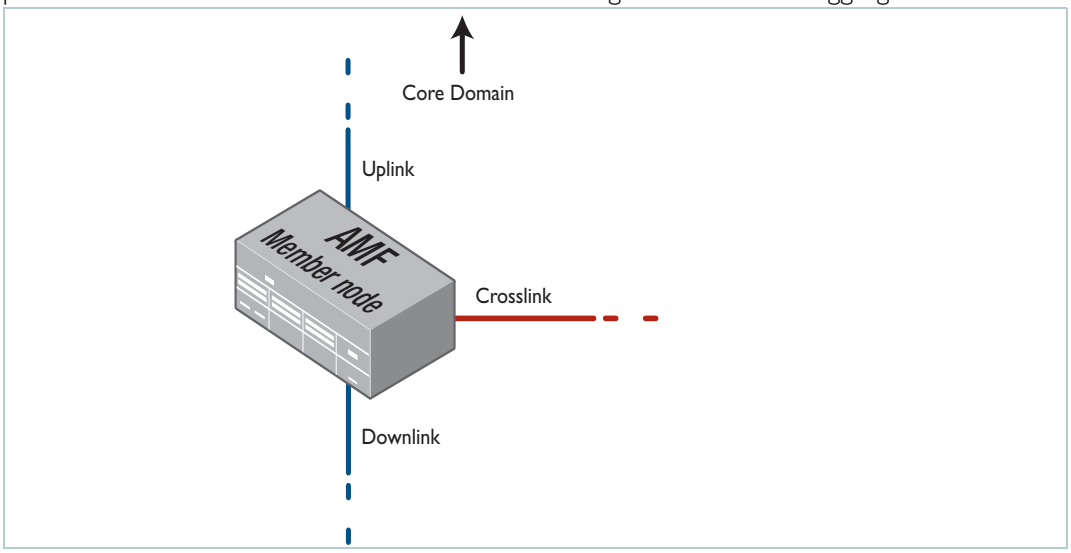

Figure 2: AMF uplinks, downlinks, and crosslinks

Working-sets

An AMF working-set is a set of nodes, which is either arbitrarily user defined, or one of the pre-defined working-set groups (see **"Working-set groups" on page 38**). Specifying or selecting a working-set allows CLI commands to be executed on all nodes within the selected working-set with a single command. A working-set can be defined, selected and configured from any node within an AMF network.

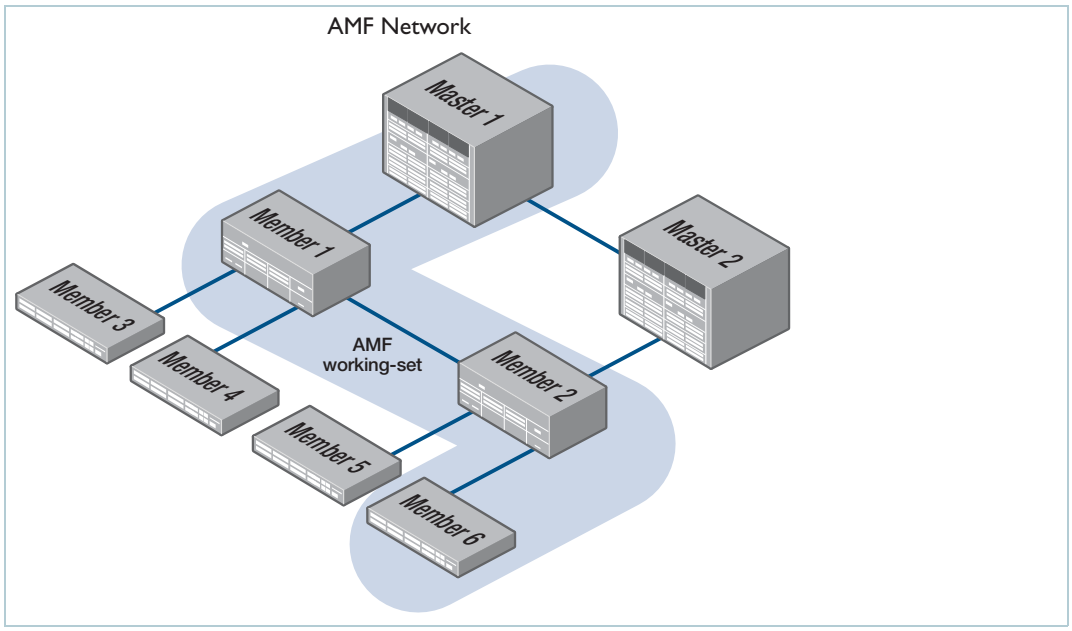

Figure 3: AMF working-set containing nodes Master1, Member1, Member2, and Member6

AMF network guidelines

Retention and use of the 'manager' username

The default **username** for an Alliedware Plus login is *manager*, with a documented default **password**. Users should change this password on all their nodes to provide login security. In order to centrally manage nodes undergoing automated node recovery, or to expand the network by adding a new unconfigured node, it will be necessary to login with the default *manager* username.

It is possible to add new usernames and passwords to nodes, but to retain the ability to centrally manage the network, usernames should be uniformly configured across all AMF nodes within the AMF network.

Loop-free data plane

The current version of AMF does not control the data plane, so it is a requirement that the network is configured such that the data plane is kept loop free.

Note: Currently AMF does not support the use of STP on links between AMF nodes. Use of STP with redundant network links has the potential to block AMF control connections, and also could lead to periods of traffic leakage during the start of automatic node recovery. Hence, if there are physical loops in any of the data VLANs in the network, then EPSR must be used as the protection mechanism for those loops.

Aggregators

Dynamic Aggregators (LACP) cannot be used on ports configured as AMF links or cross-links. Therefore any aggregated links in an AMF network need to be configured as static aggregators.

VCStacks

If any VCStacks are included as AMF nodes it is a requirement that the ***VCS virtual MAC*** feature is enabled to ensure correct operation of the AMF network. If the VCStack is running as an AMF master node it is also a requirement that removable external storage media is installed in both stack members.

AMF external removable media

All AMF master nodes require external storage media (e.g. USB memory stick, SD card) to be installed. This external storage is used to hold a backup of all relevant files from all nodes within the AMF network, including other master nodes, so it must be large enough to be able to accommodate all of the backed up files. Files that are backed up include all configuration files, release files, and scripts, but not core dumps, exception logs, or technical support files.

Typically a ***4GB*** capacity external media device would be of sufficient size to hold backups for a ***40 node*** AMF network.

When using Dual CFCs in a SBx8100, a memory stick is required in both CFCs.

AMF interaction with QoS and ACLs

It's important that ACL and QoS rules do not block any traffic on VLAN 4091 and 4092 as they are the default AMF control VLANs. Likewise ACL and QoS rules should not block any Layer 3 traffic on 172.31.0.* or 172.31.128.* as these are the default AMF management traffic subnets. Packets with protocol type 0xfbae and BPDU packets that use the MAC address: 0180.c200.002e should also not be blocked.

Note: The AMF control VLANs and AMF management subnets can be manually changed.

With AMF enabled, the number of ACLs on the x510 switch decreases from 249 to 248. If this is an issue, then you can disable AMF, which will allow the previous maximum of 249.

Enabling AMF on the x610 switch provides 2048 ACLs.

NTP and AMF

AMF uses NTP to synchronize the system clocks across nodes within the network. For this to operate there must either be one or more external NTP servers configured on the network, or one single AMF node must be configured as the NTP 'master' using the command **ntp master 11**.

Note: It is not valid to have an NTP master configured on an AMF node anywhere in the network if any external NTP servers exist, as this will prevent clock synchronization.

If there is no external server, and instead the network has a node configured with the command: **ntp master 11**, the following commands will work as expected:

```
awplus (config)#atmf working set group all
awplus (config)#clock set 16:51:00 24 Aug 2012
```

The **clock set** command may also be used prior to configuring an external NTP server to get the network roughly up to the correct time, so that NTP will synchronize faster.

The primary function of NTP within an AMF network is to ensure that time and date stamps on backups are consistent across member nodes within the backup. This is particularly important in an AMF network that has multiple AMF master nodes, to ensure that node recovery is performed with the most up to date backup.

Configuring AMF

The following configuration example uses a simplified network to explain the steps required to configure AMF.

Simple AMF example with a single master

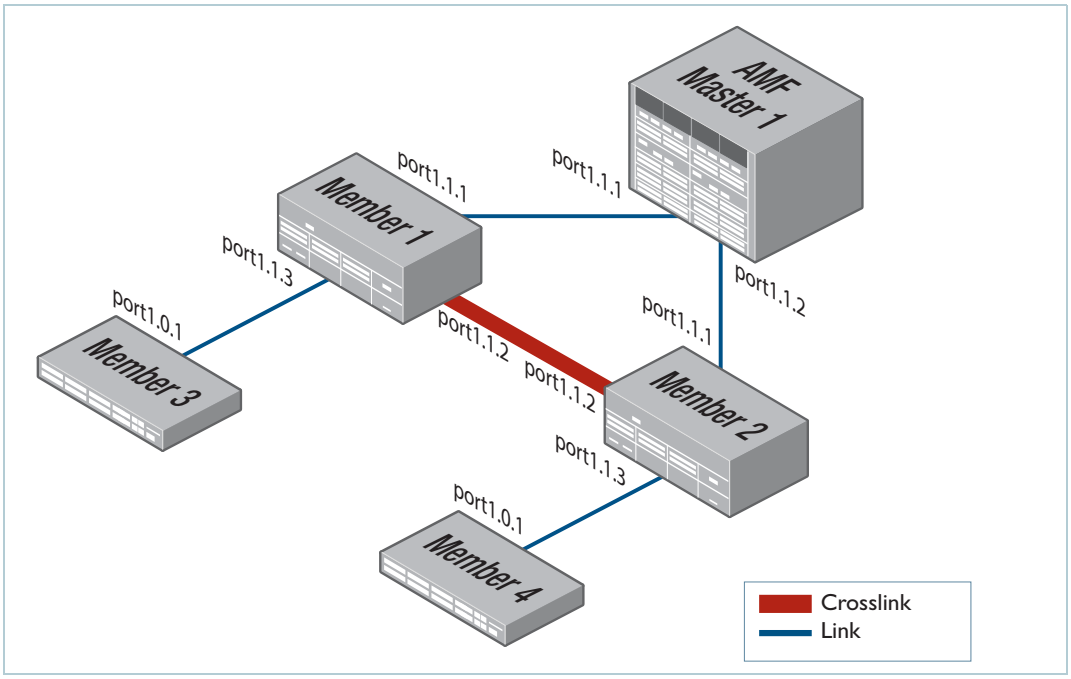

Figure 4: Simple AMF network

Configuration

AMF Master

1. Set the host name.

```
awplus#conf t
awplus(config)#hostname AMF_Master
```

Host names are used as the AMF node name and must be unique within the AMF network.

2. Set the AMF network name.

```
AMF_Master (config)#atmf network-name atmf1
```

Note: The AMF network name must be the same on all nodes within the AMF network, and the device must be ***rebooted*** before the AMF network name takes effect.

3. Configure the device as the AMF master.

```
AMF_Master (config)#atmf master
```

An AMF network must have at least one master configured. A licence is required for each AMF master in the AMF network. If an AT-x8100 with dual CFCs is configured as an AMF master a licence is only required on the CFC master, as the licence with be synchronized

across CFCs. If an AT-x908 VCStack is configured as an AMF master, a licence is required to be installed on ***both*** stack members.

4. Configure the data VLANs.

```
AMF_Master(config)#vlan database
AMF_Master(config-vlan)#vlan 2-3
```

5. Disable RSTP globally (this is enabled by default).

```
AMF_Master (config)#no spanning-tree rstp enable
```

6. Configure ports as AMF-links.

```
AMF_Master(config)#int port1.1.1-1.1.2
AMF_Master(config-if)#switchport atmf-link
```

7. Configure data VLANs on AMF-links as required.

```
AMF_Master (config-if)#switchport trunk allowed vlan add 2-3
```

8. Save the configuration and reboot the switch.

```
AMF_Master #copy running-config startup-config
Building configuration...[OK]
AMF_Master#reload
Are you sure you want to reboot the whole chassis? (y/n): y
```

Configuration **Member 1**

1. Set the host name.

```
awplus#conf t
awplus(config)#hostname Member1
```

Host names must be unique within the AMF network.

2. Set the AMF network name.

```
Member1(config)#atmf network-name atmf1
```

Note: The AMF network name must be the same on all nodes within the AMF network, and the device must be rebooted before the AMF network name takes effect.

3. Configure data VLANs.

```
Member1(config)#vlan database
Member1(config-vlan)#vlan 2-3
```

4. Disable RSTP globally (this is enabled by default).

```
Member1(config)#no spanning-tree rstp enable
```

5. Configure ports as AMF-links.

```
Member1(config)#int port1.1.1,port1.1.3
Member1(config-if)#switchport atmf-link
```

6. Configure data VLANs on the AMF links as required.

```
Member1(config-if)#switchport trunk allowed vlan add 2-3
```

7. Configure AMF-crosslink.

```
Member1(config)#int port1.1.2
Member1(config-if)#switchport atmf-crosslink
Member1(config-if)#switchport trunk native vlan none
```

Note: AMF links and crosslinks are not required to be configured with data VLANs and can be used solely to provide AMF management VLAN redundancy.

8. Save the configuration and reboot the switch.

```
Member1#copy running-config startup-config
Building configuration...
[OK]
Member1#reload
reboot system? (y/n): y
```

Configuration *Member 2*

1. Set the host name.

```
awplus#conf t
awplus(config)#hostname Member2
```

Note: Hostnames are used as the AMF node name and must be unique within the AMF network..

2. Set the AMF network name.

```
Member2(config)#atmf network-name atmf1
```

Note: The AMF network name must be the same on all nodes within the AMF network, and the device must be rebooted before the AMF network name takes effect.

3. Configure a data VLAN.

```
Member2(config)#vlan database
Member2(config-vlan)#vlan 2-3
```

4. Disable RSTP globally (this is enabled by default).

```
Member2(config)# no spanning-tree rstp enable
```

5. Configure ports as AMF-links.

```
Member2(config)#int port1.1.1,port1.1.3
Member2(config-if)#switchport atmf-link
```

6. Configure data VLANs on the AMF-links as required.

```
Member2(config-if)#switchport trunk allowed vlan add 2-3
```

7. Configure AMF-crosslink.

```
Member2(config)#int port1.1.2
Member2(config-if)#switchport atmf-crosslink
Member2(config-if)#switchport trunk native vlan none
```

Note: AMF links and crosslinks are not required to be configured with data VLANs and can be used solely to provide AMF management VLAN redundancy.

8. Save the configuration and reboot the switch.

```
Member2#copy running-config startup-config
Building configuration...
[OK]
Member2#reload
reboot system? (y/n): y
```

Configuration *Member 3*

1. Set the host name.

```
awplus#conf t
awplus(config)#hostname Member3
```

Host names must be unique within the AMF network.

2. Set the AMF network name.

```
Member3(config)#atmf network-name atmf1
```

Note: The AMF network name must be the same on all nodes within the AMF network, and the device must be rebooted before the AMF network name takes effect.

3. Configure data VLANs on the AMF-link.

```
Member3(config)#vlan database
Member3(config-vlan)#vlan add 2-3
```

4. Disable RSTP globally (this is enabled by default).

```
Member3(config)#no spanning-tree rstp enable
```

5. Configure ports as AMF-links.

```
Member3(config)#int port1.0.1
Member3(config-if)#switchport atmf-link
```

6. Configure data VLANs on the AMF links as required.

```
Member3(config-if)#switchport trunk allowed vlan add 2-3
```

7. Save the configuration and reboot the switch.

```
Member3#copy running-config startup-config
Building configuration...
[OK]
Member3#reload
reboot system? (y/n): y
```

Configuration *Member 4*

1. Set the host name.

```
awplus#conf t
awplus(config)#hostname Member4
```

Host names must be unique within the AMF network.

2. Set the AMF network name.

```
Member4(config)#atmf network-name atmf1
```

Note: The AMF network name must be the same on all nodes within the AMF network, and the device must be rebooted before the AMF network name takes effect.

3. Configure data VLANs

```
Member4(config)#vlan database
Member4(config-vlan)#vlan 2-3
```

4. Disable RSTP globally (this is enabled by default).

```
Member4(config)#no spanning-tree rstp enable
```

5. Configure ports as AMF-links.

```
Member4(config)#int port1.0.1
Member4(config-if)#switchport atmf-link
```

6. Configure data VLANs on the AMF links as required.

```
Member4(config-if)#switchport trunk allowed vlan add 2-3
```

7. Save the configuration and reboot the switch.

```
Member4#copy running-config startup-config
Building configuration...
[OK]
Member4#reload
reboot system? (y/n): y
```

Verifying the AMF network

To check that all nodes have joined the AMF network use the **show atmf summary** command, which can be executed from any node in the AMF network:

```
AMF_Master#show atmf summary
ATMF Summary Information:
ATMF Status            : Enabled
Network Name           : atmf1
Node Name              : AMF_Master
Role                   : Master
Current ATMF Nodes     : 5
AMF_Master#
```

The **Current ATMF Nodes** field in the output above shows that all 5 nodes have joined the AMF network.

Use the **show atmf nodes** command to check information on individual nodes:

```
AMF_Master#show atmf nodes
Node Information:
  * = Local device
 SC = Switch Configuration:
  C = Chassis    S = Stackable    N = Standalone
Node              Device          ATMF                          Node
Name              Type            Master      SC  Parent        Depth
-----------------------------------------------------------------------
* AMF_Master        AT-SBx81CFC400      Y      C   none             0
  Member1           SwitchBlade x908    N      S   AMF_Master       1
  Member2           SwitchBlade x908    N      S   AMF_Master       1
  Member4            x510-52GTX         N      S   Member2          2
  Member3            x510-52GTX         N      S   Member2          2
 Current ATMF node count 5
```

Note: The ***Parent*** field refers to the parent ***domain*** and not the upstream device. In the example output above, Member2 is the domain controller for the parent domain for Member3 and Member4.

Using the AMF network

AMF backups

AMF backups are an essential part of AMF network operation, as they are the mechanism by which AMF master nodes update their records of the AMF network. By default, AMF master nodes are configured to perform automatic scheduled backups of the entire AMF network once per day at 3.00am. AMF backups are stored on external removable media (e.g. USB Flash stick, SD card), thus it is a requirement that all AMF masters have external removable media installed that is of sufficient capacity to hold all of the relevant files stored in the Flash by every node in the AMF network.

Typically a ***4GB*** capacity external media device would be of sufficient size to hold backups for a ***40 node*** AMF network.

The AMF node backup system has been designed such that the external media used to store the backup data can still be used to store other data, however care needs to be taken to ensure that enough space is reserved for future AMF backups.

- AMF requires up to 128MB backup space for SBx8100 nodes and up to 64MB backup space for other nodes. The **show atmf backup** command output will provide warnings if capacity on the backup media falls below a safe level.

Here is some example output of the **show atmf backup** command showing a backup media space warning:

```
master1#show atmf backup

Scheduled Backup ...... Disabled
  Schedule ............ 1 per day starting at 12:45
  Next Backup Time .... 25 May 2012 12:45
Backup Media .......... SD (Total 3827.0MB, Free 7.1MB)
                        WARNING: Space on backup media is below 64MB
Current Action ........ Idle
  Started ............. -
  Current Node ........ -
```

Safe removal of external storage media

Removing external storage media, or rebooting the master node, while an AMF backup is underway could potentially cause corruption to files in the backup. Although files damaged as a result of mishandling backup media will be replaced during the next backup cycle, if the file system on the media becomes damaged it may require reformatting before being inserted into the AMF master. To avoid any damage to the AMF backup files or file system it is recommended that the following procedure is followed before rebooting or removing any external storage media from an AMF master.

1. Disable backups to prevent a scheduled backup from occurring while the card is being removed.
2. Terminate any backup already in process.
3. Verify that it is safe to remove the media by checking for a ***Disabled*** scheduler and ***Idle*** backup.

Here is an example output showing the safe external storage media removal procedure:

```
master1#conf t

master1(config)#no atmf backup enable
master1(config)#exit
master1#atmf backup stop
master1#show atmf backup

Scheduled Backup ...... Disabled
  Schedule ............ 1 per day starting at 12:45
  Next Backup Time .... 25 May 2012 12:45
Backup Media .......... SD (Total 3827.0MB, Free 3257.1MB)
Current Action ........ Idle
  Started ............. -
  Current Node ........ -
...
```

Once the media has been reinstalled, ensure that the backup scheduler is re-enabled:

```
master1#conf t
master1(config)#atmf backup enable
master1(config)#exit
```

Performing a manual backup

Whenever a new device is added to the AMF network or when the configuration has changed on a member node, it is always advisable to perform a manual backup from the AMF master in order to ensure the removable media installed on the master node has an up to date backup of all nodes within the AMF.

To perform a manual backup of the entire AMF network, on the AMF master enter the command **atmf backup now**:

```
AMF_Master#atmf backup now
Backup successfully initiated
AMF_Master#
```

To check the status of the AMF backup use the command **show atmf backup**.

Example output of the **show atmf backup** command during backup:

```
AMF_Master#show atmf backup
Scheduled Backup ...... Enabled
  Schedule ............ 1 per day starting at 03:00
  Next Backup Time .... 14 Dec 2012 03:00
Backup Media .......... USB (Total 3692.6MB, Free 1782.7MB)
Current Action ........ Doing manual backup
  Started ............. 13 Dec 2012 05:20
  Current Node ........ Member1
Node Name                      Date         Time      In ATMF  On Media  Status
-------------------------------------------------------------------------------
AMF_Master                13 Dec 2012  05:20:16      Yes      Yes      Good
Member1                        -            -         Yes      Yes       -
Member2                        -            -         Yes      No        -
Member3                        -            -         Yes      No        -
Member4                        -            -         Yes      No        -
```

Example output of the **show atmf backup** command after backup has completed:

```
AMF_Master#show atmf backup
Scheduled Backup ...... Enabled
  Schedule ............ 1 per day starting at 03:00
  Next Backup Time .... 13 Dec 2012 03:00
Backup Media .......... USB (Total 3692.6MB, Free 1651.1MB)
Current Action ........ Idle
  Started ............. -
  Current Node ........ -

Node Name                      Date         Time     In ATMF  On Media  Status
-------------------------------------------------------------------------------
ATMF_Master                13 Dec 2012  05:20:16  Yes      Yes       Good
Member1                    13 Dec 2012  05:20:27  Yes      Yes       Good
Member2                    13 Dec 2012  05:20:40  Yes      Yes       Good
Member3                    13 Dec 2012  05:20:52  Yes      Yes       Good
Member4                    13 Dec 2012  05:21:08  Yes      Yes       Good
```

Note: The file system used by the AMF backup does not support the backing up of files that have the same name but have different case (e.g. "test.txt" and "TEST.txt"), and only one of these files will be stored in the backup. For this reason it is recommended that all files on a node have unique file names.

Backups on VCStacks running as AMF masters

When a VCStack or SBx8100 with dual CFCs is running as an AMF master node, it is important to note that an AMF backup will only occur on the external removable media installed in the VCS master (or Active CFC). This means that following a failover event, the new VCS master will not have an AMF backup stored on its external storage media, and will not be able to provide configuration backup and recovery when required.

To avoid this situation, the recommended solution is to use ***trigger scripts*** to automatically perform a manual backup of the AMF network following a failover event.

Example manual backup activation script called **triggered-atmfbackup.scp**:

```
enable
wait 180
atmf backup now
```

Note: There is a syntax difference between the configuration commands required to create the necessary trigger on the SBx8100 and SBx908.

Example trigger script configuration for the SBx***8100***:

```
awplus#conf t
awplus(config)#trigger 1
awplus(config-trigger)#type chassis active-CFC-fail
awplus(config-trigger)#script 1 triggered-atmfbackup.scp
```

Example trigger script configuration for the SBx***908***:

```
awplus#conf t
awplus(config)#trigger 1
awplus(config-trigger)#type stack master-fail
awplus(config-trigger)#script 1 triggered-atmfbackup.scp
```

If there are multiple AMF master nodes in the network, you may also want to use a trigger script or perform a manual backup of all master nodes whenever there is a failover event to ensure that all backups are up to date. Create an atmf working-set group which contains all master nodes, and then use the **atmf working-set** command in the trigger script to execute the manual backup on all nodes within the working set group.

To create a working-set containing all AMF master nodes, first manually select all AMF masters using the **atmf working-set** command:

```
Master#atmf working-set Master1,Master2
====================
Master1, Master2:
====================
Working set join
atmf1[2]#
```

Next, create a user defined working-set group containing the nodes in the current working-set using the **atmf group** command:

```
atmf1[2]#conf t
atmf1[2](config)#atmf group AMF_masters
```

Here is an example manual backup activation script called *atmfbackup_all_masters.scp*:

```
enable
wait 180
atmf working-set group AMF_masters
atmf backup now
```

Node recovery

Automatic node recovery

AMF has been designed so that when a node fails it can be replaced with an unconfigured device of the same type, and AMF will automatically upgrade and configure the new device from the most recent backup. Often the replacement device will be a factory default, brand new "out of the box" device, but it may be that you want to replace the failed unit with one that has been previously used elsewhere. In this instance it is necessary to return the replacement device to a "clean" state so that AMF can recognize it as a suitable replacement, and begin automatic recovery. (See section **"A "Clean" node" on page 31**)

When a failed node is replaced with an unconfigured device, AMF immediately disables forwarding on the device, shuts down all non-AMF ports, and applies the AMF safe configuration. (See section **"AMF safe configuration" on page 34**.) AMF then checks whether any of the AMF master nodes has a valid backup for the replacement node, and if it finds one it begins to attempt automatic node recovery. Once automatic node recovery has completed, it will then reboot the replacement node which will then rejoin the AMF network with identical files and configuration, to the failed node it replaced.

Here is some example console output showing automatic node recovery:

Warning: *No changes should be made to the device's configuration while a node recovery is underway. A log message will appear on the console or other logged in session indicating when recovery has finished (whether successfully or with errors). This message can also be found by viewing the log with the* **show log** *command.*

```
23:03:15 awplus ATMF[863]: ATMF network detected
23:03:15 awplus ATMF[863]: ATMF safe config applied (forwarding
disabled)
23:03:25 awplus ATMF[863]: Shutting down all non ATMF ports
23:03:26 x510_1 ATMF[863]: Automatic node recovery started
23:03:26 x510_1 ATMF[863]: Attempting to recover as x510_1
23:03:26 x510_1 ATMF[863]: Checking master node availability
23:03:32 x510_1 ATMF[863]: Master has joined. 2 members in total.
23:03:32 x510_1 ATMF[863]: x908_VCS_2 has joined. 3 members in total.
23:03:32 x510_1 ATMF[863]: x908_VCS_1 has joined. 4 members in total.
23:03:37 x510_1 ATMFFSR[2950]: Retrieving recovery data from master
node Master
23:05:18 x510_1 ATMFFSR[2950]: File recovery from master node
succeeded. Node will now reboot
Flushing file system buffers...
Unmounting any remaining filesystems...
Restarting system.
```

A "Clean" node

The recommended procedure for returning a device to a "clean" state is to remove any pre-existing boot configuration, including any backup boot configuration, and delete all configuration files from Flash. If the device you are cleaning has previously had VCStack enabled, it is also necessary to delete the stacking configuration file.

For example:

```
configure terminal
no boot config-file
no boot config-file backup
exit
delete force *.cfg
delete force .configs/stk.conf
```

Any user created folders in Flash will have to be removed. Firstly, identify if any user created folders exist.

```
cd flash:
dir
...
0 drwx Aug 20 2012 15:01:44  example_dir/
...
```

A folder is identified as having permissions **drwx**. Once you have identified them, any user created folder and its contents should be removed.

```
rmdir force example_dir
```

In addition, any external media installed in the device should be physically removed. If you are unable to remove the external media from the device then make sure any *autoboot.txt* files are removed from the external media. This may be achieved with one of the following commands:

```
delete force card:autoboot.txt
delete force usb:autoboot.txt
```

Note: The procedure above contains the minimum requirements to return a device to a clean state in order for AMF automatic node recovery to work. However, it should be noted that any other user files that remain in Flash will be overwritten during the automatic recovery process. If there are any files stored in the Flash of the replacement device that need to be retained, these files should be backed up prior to installing the device into the AMF network.

Manual node recovery

There are certain situations where, for a number of different reasons, automatic recovery may fail. Automatic recovery has been deliberately designed to be cautious in its approach to recovering a node and for reasons such as:

- The backup stored on the AMF masters not having a "Good" status
- The replacement device is of a different type to the node being replaced

When these situations occur, automatic node recovery may fail.

If automatic node recovery fails, the replacement device will have AMF safe configuration mode applied, (see section **"AMF safe configuration" on page 34**). If automatic node recovery fails, you may wish to proceed with manual node recovery, which can be initiated by entering the command:

```
atmf recover {<node_name>} {<master_node_name>}
```

Where:

- `node_name` is the host name of the device you wish to recover.
- `master_node_name` is the host name of the AMF master that contains the backup you want to use for the recovery.

Here is an example showing manual recovery:

```
awplus#atmf recover x510_1 Master
This command will erase ALL flash contents.  Continue node recovery?
(y/n)y
Manual node recovery successfully initiated
x510_1#23:15:32 x510_1 ATMFFSR[8477]: Retrieving recovery data from
master node Master
23:17:17 x510_1 ATMFFSR[8477]: Manual node recovery completed
x510_1#
```

Note: The manual recovery command will bypass the usual checks performed by automatic node recovery, it is important to be confident that the backup configuration stored on the specified AMF master is correct prior to executing the command.

If the replacement device is of a different type to the one stored in the backup on the specified AMF master node, the incompatible release file from the backup will not be copied to the replacement device. Instead, the existing release on the replacement device will be used, in order to ensure the device is able to join the AMF network and function correctly.

Node recovery on VCStacks

Node recovery on VCStacks that are part of an AMF network is somewhat different to node recovery of standalone devices. This is because VCStack has its own node recovery mechanism which has different requirements to AMF.

Typically a failure on a VCStack will only affect one stack member.

In this instance, so long as:

- The replacement device is running a compatible firmware version
- The Stack ID on the replacement device is set to the same ID as the device being replaced
- The replacement device is installed with the same licences as other stack members

Then, VCStack will synchronize the configuration and firmware.

In the extremely unlikely situation of needing to replace an entire VCStack that is a member of an AMF network, you can use AMF automatic node recovery to first recover stack ID 1, which will become the VCstack master.

Note: The replacement device which will become the VCStack master must be a **clean** unit, (see the section **"A "Clean" node" on page 31**).

The procedure for recovering an entire stack is as follows:

1. Connect a **clean** device to the AMF network, and power it on. The connections into the AMF network should be between the appropriately configured AMF links on the neighboring node, and the ports previously configured as AMF links in the backup for the failed node configuration.
2. The AMF network should detect the replacement device and begin automatic node recovery. Wait until automatic node recovery completes and check that the replacement device has come up correctly as VCStack ID 1, and that the configuration is correct.
3. Configure the next replacement device as VCStack ID 2. Ensure it is installed with a compatible release and the same set of licences that exist on ID 1. Connect the VCStack cables and power it on.
4. VCStack ID 1 should detect ID 2 and synchronize the configuration and firmware release. Once this has completed, check that the VCStack has formed correctly, and then connect the remaining network connections.

For any additional VCStack members, repeat the last two steps, ensuring that the VCStack ID is set to the next sequential value for each additional device that is added to the VCStack.

AMF safe configuration

If, for any reason, AMF automatic node recovery fails, AMF contains a safety net feature which puts the replacement node into a safe configuration state. This is to prevent an unconfigured device from joining the network and creating loops.

How can I tell if my device has had AMF safe configuration applied?

A log message will be generated when AMF safe configuration is applied. This message will appear in the log some time after the startup sequence.

The message will also be output to the console or any connected VTY session.

```
22:39:30 awplus ATMF[638]: ATMF safe config applied (forwarding disabled)
```

What does safe config do?

The components of the AMF safe configuration are:

- A special VLAN is created in the disabled state and given the name `atmf_node_recovery_safe_vlan`. The index of this VLAN is determined dynamically to ensure it does not conflict with AMF management VLANs which are detected through the AMF network.
- All ports are removed from their default VLAN membership (VLAN 1).
- All ports are set as tagged members of the safe VLAN.
- All ports are configured to have no native VLAN.
- Additionally, all ports that are not an AMF link or cross-link are shutdown. The links and crosslinks are detected by AMF and added to the dynamic configuration. This is done to ensure correct behaviour of static aggregators and Layer 3 protocols configured on the neighboring devices.

See below for example output of the **show vlan brief** command for a device in AMF safe configuration mode:

```
awplus#sh vlan brief

VLAN ID  Name             Type    State   Member ports   (u)-Untagged, (t)-Tagged
======= ================ ======= ======= ======================================
1       default          STATIC  ACTIVE
4090    atmf_node_recovery_safe_vlan
                         STATIC  SUSPEND port1.0.1(t)  port1.0.2(t) port1.0.3(t)
                                         port1.0.4(t)  port1.0.5(t) port1.0.6(t)
                                         port1.0.7(t)  port1.0.8(t) port1.0.9(t)
                                         port1.0.10(t) port1.0.11(t)
                                         port1.0.12(t) port1.0.13(t)
                                         port1.0.14(t) port1.0.15(t)
                                         port1.0.16(t) port1.0.17(t)
                                         port1.0.18(t) port1.0.19(t)
                                         port1.0.20(t) port1.0.21(t)
                                         port1.0.22(t) port1.0.23(t)
                                         port1.0.24(t)
```

See below for an example excerpt from the **show running-configuration** command for a device in AMF safe configuration mode:

```
awplus#show running-config
...
!
vlan database
 vlan 4090 name atmf_node_recovery_safe_vlan
 vlan 4090 state disable
!
interface port1.0.1-1.0.4
 shutdown
 switchport
 switchport mode trunk
 switchport trunk allowed vlan add 4090
 switchport trunk native vlan none
!
interface port1.0.5
 switchport
 switchport atmf-link
 switchport mode trunk
 switchport trunk allowed vlan add 4090
 switchport trunk native vlan none
!
interface port1.0.6-1.0.24
 shutdown
 switchport
 switchport mode trunk
 switchport trunk allowed vlan add 4090
 switchport trunk native vlan none
!
...
```

How can I undo a safe configuration?

If your node has had AMF safe configuration applied, you can use normal CLI configuration commands to modify the running-configuration to whatever configuration is required.

See below for an example of returning a device from AMF safe configuration to default VLAN and port settings. Note - In this example a 24-port device has been used.

```
awplus#conf t
awplus(config)#interface port1.0.1-port1.0.24
awplus(config-if)#switchport trunk native vlan 1
awplus(config-if)#switchport trunk allowed vlan remove 4090
awplus(config-if)#switchport mode access
% port1.0.5 has ATMF link configured so mode cannot be changed
awplus(config-if)#no shutdown
awplus(config-if)#exit
awplus(config)#vlan database
awplus(config-vlan)#no vlan 4090
awplus(config-if)#end
```

In order to retain connectivity to the AMF network, AMF link and crosslink settings should not be changed. In the example above you can see that port1.0.5 is an automatically configured ATMF link. You can see the error message indicating it was skipped by the **switchport mode access** command, as AMF links must be in trunk mode.

Warning: *No changes should be made to the device's configuration while a node recovery is underway. A log message will appear on the console or other logged in session indicating when recovery has finished (whether successfully or with errors). This message can also be found by viewing the log with the* ***show log*** *command.*

Adding a preconfigured device to the network

In many cases when a new device is to be added to the network, a user will want to fully pre-configure it before connecting it to the network. This is for the obvious reason that it is generally not a good idea to have an unconfigured device connected to the network.

With AMF it is possible to perform this pre-configuration by cloning the configuration from the backup of an existing AMF node. The cloned configuration will be applied in a safe way to the similar node that you wish to join the AMF network. In this way a node can be added to the network without the need to construct the configuration elements that are common to another node.

There are two methods that can be used to achieve this:

1. By connecting an unconfigured clean node (see section **"A "Clean" node" on page 31**), to the AMF network. Wait for automatic node recovery to fail and the AMF safe configuration to be applied. Then use the **atmf recover** command, followed by the node name of a similar node, to replicate the desired configuration to the new unit.
2. By preconfiguring the new device with the AMF network name, a node name, and an AMF link prior to connecting it to the AMF network. Then use the **atmf recover** command followed by the node name of a similar node, to replicate the desired configuration to the new unit.

In both methods it is necessary to configure an AMF link on the neighboring node that is to be connected to the new node, so the new node will be able to join the AMF network.

Note: It is recommended that the donor node selected is as close as possible to the new node, and contains the same number of ports or if applicable, has the same XEMs installed in the same bays. This will limit the number of manual changes that will be required to the replicated configuration of the new node.

If using the first method described above, it is safe to connect ports other than the AMF link. This is because forwarding will be disabled and all ports administratively shutdown when the AMF safe configuration is applied.

If using the second method described above, it is important to only connect the atmf-link until the configuration can be appropriately edited and the node rebooted. Following this

procedure ensures that there is no possibility of creating loops by having an unconfigured node connected to the network.

The example below shows a clean node that has been connected to a port on a neighboring AMF node that configured as an atmf-link. AMF detects the new node and attempts automatic node recovery, but because the new node is not present in the backup stored on the AMF master, the automatic recovery fails and the AMF safe configuration is applied:

```
04:26:36 awplus ATMF[846]: ATMF network detected
04:26:36 awplus ATMF[846]: ATMF safe config applied (forwarding
disabled)
04:26:46 awplus ATMF[846]: Shutting down all non ATMF ports
04:26:46 awplus ATMF[846]: host_0000_cd28_08cd has left. 0 member in
total.
04:26:46 awplus ATMF[846]: host_0000_cd28_08cd has joined. 1 member in
total.
04:26:46 awplus ATMF[846]: No identity found for this device so
automatic node
recovery is not possible
04:26:53 awplus ATMF[846]: x510_1 has joined. 2 members in total.
04:26:53 awplus ATMF[846]: Master has joined. 3 members in total.
04:26:53 awplus ATMF[846]: x908_VCS_2 has joined. 4 members in total.
04:26:53 awplus ATMF[846]: x908_VCS_1 has joined. 5 members in total.
```

Once automatic recovery has failed you can now use the **atmf recover** command to replicate the configuration from the designated similar node:

```
awplus#atmf recover x510_2
This command will erase ALL flash contents.  Continue node recovery?
(y/n)y

Manual node recovery successfully initiated

awplus#04:38:24 awplus ATMFFSR[15686]: Retrieving recovery data from
master node Maste
r
04:40:11 awplus ATMFFSR[15686]: Manual node recovery completed
```

When the recovery has completed, the new node will be configured to boot from the cloned configuration, but the configuration will not be applied to the node until it is rebooted. This way the configuration can be appropriately modified using the AlliedWare Plus in built editor before the unit is rebooted and the configuration applied.

Using the unified CLI with working-sets

The unified CLI is a central component of AMF. It provides users with a configuration and display interface that can control the entire AMF network from a single point. Control of the nodes within an AMF network is provided through the **working-set** command.

The working-set

An AMF working-set is a set of nodes, which is either arbitrarily user defined or one of the pre-defined working-set groups. Specifying or selecting a working-set allows CLI commands to be executed on all nodes within the selected working-set with a single command. A working-set can be defined, selected and configured from any node within an AMF network.

By default, when you first log into a node that is part of an AMF network, you are implicitly placed into the working-set group **local**, a working-set which only contains the local node. In this instance the CLI prompt when you log in will look the same as on any other AlliedWare plus device.

```
Node1>enable
Node1#
```

To create a working set containing a set of nodes use the command **atmf working-set** followed by a comma separated list of the nodes you wish to control. Whenever you select a working set containing any nodes other than the local device, the CLI prompt will display the AMF network name, followed by the number of nodes contained in the working set in square brackets.

```
Node1#atmf working-set Node1,Node2
==============
Node1, Node2
==============
Working set join
atmf1[2]#
```

To return to just controlling the local device from any other working set, use the command **atmf working-set group local.**

Working-set groups

AMF contains the ability to have working-set groups, so that it is not always necessary to use a comma separated list to specify a working-set.

AMF working-set groups can be split into two types:

- Automatic
- User-defined

Automatic working-set groups

There are three automatic working-set groups that will exist on every AMF network:

1. *All*—all nodes within the AMF network.
2. *Current*—the current working-set of nodes. This group is useful for adding additional nodes to the current working-set.
3. *Local*—the local device

In any AMF network there will also be a number of other automatic working-set groups that are dependent on the platform types which exist within the network. To see the platform dependent automatic working-set groups that exist on the AMF network use the command **show atmf group members automatic**:

```
x908_VCS_1#show atmf group members automatic

Retrieving Automatic groups from:
x510_1 Master x908_VCS_2 x908_VCS_1

ATMF Group membership

Automatic        Total
Groups           Members   Members
poe              1         Master
x510             1         x510_1
SBx8100          1         Master
x900             2         x908_VCS_2 x908_VCS_1
```

To select a working-set group use the command **atmf working-set group** followed by the group name. You can specify a single group, a comma separated list of groups, or even a comma separated list of individual nodes, followed by a comma separated list of groups:

```
x908_VCS_1#atmf working-set x510_1,x510_2 group x900
=====================================
x510_1, x510_2, x908_VCS_1, x908_VCS_2:
=====================================
Working set join
atmf1[4]
```

Note: If a partially invalid working-set node list or group list is specified, only the valid nodes or groups will join the working set. If a completely invalid working-set is specified you will create a working-set containing no nodes and a warning message will be generated to alert you that the current working-set is empty:

```
atmf1[3]#atmf working-set group x511
% Warning - working set is now empty
atmf1[0]#
```

User-defined working-set groups

In addition to the automatic working-set groups, it is also possible to create user-defined groups for arbitrary sets of nodes that the user may wish to group together. For example, all AMF master nodes.

To create and use a user-defined working-set group:

1. Create a working-set containing the desired nodes.
2. In global configuration mode use the command: **atmf group <group-name>**

```
Master#atmf working-set Master1,Master2
====================
Master1, Master2:
====================
Working set join
atmf1[2]#conf t
atmf1[2](config)#atmf group Masters
```

You can see all user-defined working-set groups that exist on the AMF network with the command **show atmf group members user-defined**

```
Master1#show atmf group members user-defined

Retrieving User-defined groups from:
x510_1 Master1, Master2, x908_VCS_2 x908_VCS_1

ATMF Group membership

User-defined     Total
Groups           Members   Members
-------------------------------------------------------------------
Masters          2         Master1 Master2

Master#
```

Executing commands on working-sets

Once you have selected the desired working-set of nodes on which you wish to execute commands, in general there is no difference to executing commands on a single AlliedWare Plus device. When a command is executed that is valid for all nodes within the working-set, the output is displayed for each of the nodes separately.

Here is an example output of the **show arp** command run from a working-set:

```
atmf1[4]#show arp
=======
Master:
=======

 IP Address      MAC Address   Interface    Port      Type
172.31.0.1      eccd.6d7d.a542 ATMF       sa1         dynamic
172.31.0.3      0000.cd2b.0329 ATMF       sa1         dynamic
172.31.0.10     0000.cd37.0163 ATMF       sa1         dynamic

=======
x510_1:
=======

 IP Address      MAC Address   Interface    Port      Type
172.31.0.2      eccd.6d03.10f9 ATMF       sa4         dynamic

===========
x908_VCS_1:
===========

 IP Address      MAC Address   Interface    Port      Type
172.31.0.2      0000.cd37.1050 ATMF       sa1         dynamic

===========
x908_VCS_2:
===========

 IP Address      MAC Address   Interface    Port      Type
172.31.0.2      0000.cd37.1050 ATMF       sa3         dynamic

atmf1[4]#
```

Some commands are invalid for nodes in a working-set

There will be some commands, however, which will only be valid to execute on some of the nodes within the working-set. In this case the command will be executed on all nodes within the working-set. However, for any node for which the command is not valid, the command execution will fail and the output displayed will indicate the nodes on which the command succeeded and nodes on which the command failed.

The following is example output of the **show card** command run from a working-set, which is only a valid command for the SBx8100 series switches:

```
atmf1[4]# show card
=======
Master:
=======

Slot Card Type        State
-------------------------------------------------------------------------
1    AT-SBx81GP24     Online
2    AT-SBx81GP24     Online
3    AT-SBx81XZ4      Online
4    AT-SBx81XS6      Online
5    AT-SBx81CFC400   Online (Active)
6    -                -
7    -                -
8    -                -
9    -                -
10   -                -
11   -                -
12   -                -
-------------------------------------------------------------------------

==============================
x510_1, x908_VCS_1, x908_VCS_2:
==============================
% Invalid input detected at '^' marker.
```

Sub-configuration limitations for some nodes in a working-set

There will also be some instances where a sub-configuration mode is only valid for some of the nodes in the working-set. One example of this case would be when entering interface configuration mode for a port that exists on some members of the working-set and not on others. For example:

```
atmf1[4]# conf t
atmf1[4](config)#int port2.1.1
===============
Master, x510_1:
===============
% Can't find interface port2.1.1
atmf1[4:2](config-if)#
```

In the example above the interface ***port2.1.1*** exists on two of the nodes in the working-set, but doesn't exist on nodes "Master" and "x510_1". The interface configuration mode fails for these nodes and a warning message is output to indicate this. The numbers within the square brackets next to the AMF network name prompt also change. The first number indicates the total number of nodes in the working set, and the second number indicates the number of nodes in the sub-configuration mode that has been entered. Any configuration commands configured in this mode will only be executed on the nodes that successfully entered the sub-configuration mode.

Entering ***exit*** while in this mode will return to global configuration mode for all nodes within the working-set:

```
atmf1[4:2](config-if)#exit
atmf1[4](config)#
```

Interactive commands

There is one other command type, known as **interactive** commands, for which it is not appropriate to execute the commands simultaneously across multiple nodes within a working-set. When any interactive commands are entered from within a working-set they will be executed on the local node only.

The list of current interactive commands, including any optional parameters are:

- ping
- mtrace/mstat
- traceroute
- boot system
- boot configuration-file
- banner login
- tcpdump
- edit
- copy
- mail
- delete
- move
- terminal monitor

Rolling-reboot firmware upgrade

The Rolling-reboot firmware upgrade feature allows nodes within an AMF network to be rebooted and upgraded in a rolling sequence in order to minimize downtime and reduce the management overhead. First specify a set of nodes within the AMF network using the **working-set** command, then use the **atmf rolling-reboot** command so all nodes in the specified working-set will be rebooted and upgraded one by one starting with the nodes furthest from the core domain, and ending with nodes closest to or in the core domain.

Once the rebooted node has finished running its configuration and has brought its ports up it re-joins the AMF network and the next node in the working-set is rebooted and upgraded.

Note: The **atmf rolling-reboot** command can also be used to reboot a set of nodes without upgrading the firmware.

To upgrade firmware, a download URL can be selected from any media location.

Supported media locations include:

- flash:
- card:
- usb:
- tftp:
- scp:
- http:

The latest compatible release for a node will be selected from this location. Several checks are performed to ensure the upgrade will succeed. This includes checking the current node release boots from Flash and that there is enough space in Flash on this node. The new release name is updated using the **boot system <release-name>** command. The old release will become the backup release file.

Note: If the release file is to be copied from a remote location (e.g. via TFTP, HTTP, etc.), then the URL should specify the exact release filename without using wild card characters.

The node is rebooted and the new software version will be used. On boot up, the software release is verified. Should an upgrade fail, the upgrading unit will fail back to old software. At the completion of this command, a report is run showing the release upgrade status of each node.

Supported units include SBx8100, SBx908, x900, x610, and x510.

The **force** command enforces a node reboot, even though the node may not be suitable for upgrading software. This command can take a significant amount of time to complete.

Note: Rolling reboot firmware upgrades can be performed on a working-set which includes the controlling node, although in this instance the user will not be presented with a summary report upon completion.

Here is an example of a Rolling Reboot firmware upgrade summary report:

```
================================================================
ATMF Rolling Reboot Complete
Node Name      Reboot Status    Release Name            Release Status
----------------------------------------------------------------
Node1     Rebooted       x510-main-20121018-2.rel         Upgraded
Node2     Rebooted       x900-main-20121018-2.rel         Upgraded
Node3     Rebooted       x610-main-20121018-2.rel         Upgraded
Node4     Rebooted     SBx81CFC400-main-20121018-2.rel    Upgraded

================================================================
```

Performing a rolling reboot upgrade

To perform a Rolling Reboot firmware upgrade on all nodes in the AMF network, first select all nodes using the default working-set group ***all***:

```
SBSBx8100#atmf working-set group all
================================================
SBSBx8100, SBx908-VCS1, SBx908-VCS2, x510_1, x510_2:
================================================
Working set join
```

Next, using the **atmf reboot-rolling** command, specify the path to the release files to which you wish to upgrade the nodes in the AMF network. In this example the release files are stored on the external USB storage media installed in the node controlling the rolling reboot firmware upgrade, in a directory called "rel". Note that because the node controlling the rolling reboot firmware upgrade is included in the nodes to be upgraded, a message is output indicating that no summary will be available on completion.

```
csg_vcf[5]#atmf reboot-rolling usb:/rel/*.rel
Retrieving data from SBSBx8100
Retrieving data from SBx908-VCS2
Retrieving data from x510_1
Retrieving data from x510_2
Retrieving data from SBx908-VCS1

ATMF Rolling Reboot Nodes:

                    Timeout
Node Name           (Minutes)  New Release File           Status
-----------------------------------------------------------------------
x510_2              9          x510-main-20121203-1.rel   Release ready
x510_1              6          x510-main-20121203-1.rel   Release ready
SBx908-VCS1         9          x900-main-20121203-1.rel   Release ready
SBx908-VCS2         9          x900-main-20121203-1.rel   Release ready
SBSBx8100           11         SBx81CFC400-main-20121203  Release ready
                                  -1.rel
% The controlling node (SBSBx8100) is included in the
rolling reboot and will be rebooted last.
No summary will be available on completion.
Continue upgrading releases ? (y/n):
=======================================================================
Copying Release    : x510-main-20121203-1.rel to x510_2
Updating Release   : x510-main-20121203-1.rel information on x510_2
=======================================================================
ATMF Rolling Reboot: Rebooting x510_2
=======================================================================
02:11:32 SBSBx8100 ATMF[1973]: x510_2 has left. 4 members in total.

% x510_2 has left the working-set
02:13:30 SBSBx8100 ATMF[1973]: x510_2 has joined. 5 members in total.
Reboot of x510_2 has completed
```

Although in this example no summary report was generated, you can refer to the progress messages output to the console to confirm that the upgrades were successful. You can also use the **atmf-working set group all** and the **show boot** commands to confirm the current boot image for each node in the AMF network.

```
================================================================================
Copying Release    : x510-main-20121203-1.rel to x510_1
Updating Release   : x510-main-20121203-1.rel information on x510_1
================================================================================
ATMF Rolling Reboot: Rebooting x510_1
================================================================================
02:14:13 SBSBx8100 ATMF[1973]: x510_1 has left. 4 members in total.

% x510_1 has left the working-set
02:15:53 SBSBx8100 ATMF[1973]: x510_1 has joined. 5 members in total.
Reboot of x510_1 has completed

================================================================
Copying Release    : x900-main-20121203-1.rel to SBx908-VCS1
Updating Release   : x900-main-20121203-1.rel information on SBx908-
VCS1
================================================================================
ATMF Rolling Reboot: Rebooting SBx908-VCS1
================================================================================
02:19:02 SBSBx8100 ATMF[1973]: x510_1 has left. 4 members in total.
02:19:02 SBSBx8100 ATMF[1973]: SBx908-VCS1 has left. 3 members in
total.

% SBx908-VCS1 has left the working-set
02:20:48 SBSBx8100 ATMF[1973]: SBx908-VCS1 has joined. 4 members in
total.
Reboot of SBx908-VCS1 has completed
02:20:51 SBSBx8100 ATMF[1973]: x510_1 has joined. 5 members in total.
================================================================
Copying Release    : x900-main-20121203-1.rel to SBx908-VCS2
Updating Release   : x900-main-20121203-1.rel information on SBx908-
VCS2
================================================================================
ATMF Rolling Reboot: Rebooting SBx908-VCS2
================================================================================
02:21:54 SBSBx8100 ATMF[1973]: x510_2 has left. 4 members in total.
02:21:54 SBSBx8100 ATMF[1973]: SBx908-VCS2 has left. 3 members in
total.

% SBx908-VCS2 has left the working-set
02:23:35 SBSBx8100 ATMF[1973]: SBx908-VCS2 has joined. 4 members in
total.
Reboot of SBx908-VCS2 has completed
================================================================================
Copying Release    : SBx81CFC400-main-20121203-1.rel to SBSBx8100
02:23:39 SBSBx8100 ATMF[1973]: x510_2 has joined. 5 members in total.
Updating Release   : SBx81CFC400-main-20121203-1.rel information on
SBSBx8100
================================================================================
ATMF Rolling Reboot: Rebooting SBSBx8100
================================================================================
02:24:07 SBSBx8100 ATMF: reboot-rolling Rebooting SBSBx8100 at request
of user manager.
```


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AMF Commands

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AMF Naming Convention

When AMF is enabled on a switch, it will automatically be assigned a host name. If a host name has already been assigned, by using the command **hostname**, this will remain. If however, no host name has been assigned, then the name applied will be the prefix, **host_** followed (without a space) by the MAC address of the device. For example, a device whose MAC address is **0016.76b1.7a5e** will have the name **host_0016_76b1_7a5e** assigned to it.

To efficiently manage your network using AMF, we strongly advise that you devise a naming convention for your network switches, and accordingly apply an appropriate hostname to each switch in your AMF network.

Controlling “show” Command Output

You can control the output of **show** commands by using the | and > or >> tokens in the following ways:

- To display only part of the output, follow the command with **|** and then other keywords (see **Output Modifiers** below)
- To save the output to a file, follow the command with **> *filename***
- To append the output to an existing file, follow the command with **>> *filename***

Using the ? after typing the **show** command displays the following information about these tokens:

```
awplus#  show users
```

```
| Output modifiers
> Output redirection
>> Output redirection (append)
```

Output Modifiers

Type the | (vertical bar) to use **Output modifiers**.

```
append    Append output
begin     Begin with the first line that contains
          matching output
exclude   Exclude lines that contain matching output
include   Include lines that contain matching output
redirect  Redirect output
```

Begin

The **begin** parameter causes the display to begin at the first line that contains the input string.

```
awplus#  show run | begin vlan1
```

```
...skipping
interface vlan1
 ip address 192.168.14.1
!!
line con 0
 login
line vty 0 4
 login
!
end
```

Exclude The **exclude** parameter excludes all lines of output that contain the input string. In the following output all lines containing the word "input" are excluded:

```
awplus#  show interface vlan1 | exclude input
```

```
Interface vlan1
  Scope: both
  Hardware is Ethernet, address is 192.168.14.1
  index 3 metric 1 mtu 1500 <UP,BROADCAST,RUNNING,MULTICAST>
  Label switching is disabled
  No Virtual Circuit configured
  Administrative Group(s): None
  DSTE Bandwidth Constraint Mode is MAM
    output packets 4438, bytes 394940, dropped 0
    output errors 0, aborted 0, carrier 0, fifo 0, heartbeat 0,
window 0
    collisions 0
```

Include The include parameter includes only those lines of output that contain the input string. In the output below, all lines containing the word "input" are included:

```
awplus#  show interface vlan1 | include input
```

```
 input packets 80434552, bytes 2147483647, dropped 0, multicast
packets 0
 input errors 0, length 0, overrun 0, CRC 0, frame 0, fifo 1,
missed 0
```

Redirect The **redirect** parameter puts the lines of output into the specified file. If the file already exists, the new output overwrites the file's contents; the new output is not appended to the existing file contents.

| **redirect** and > are synonyms.

```
awplus#  show history | redirect history.txt
```

Output Redirection The output redirection token > puts the lines of output into the specified file. If the file already exists, the new output overwrites the file's contents; the new output is not appended to the existing file contents.

| **redirect** and > are synonyms.

```
awplus#  show history > history.txt
```

Append Output The append output token >> adds the lines of output into the specified file. The file must already exist, for the new output to be added to the end of the file's contents; the new output is appended to the existing file contents.

| **append** and >> are synonyms.

```
awplus#  show history >> history.txt
```

Command List

This chapter provides an alphabetical reference for AMF commands.

atmf backup

This command can only be applied to a master node. It manually schedules an AMF backup to start at a specified time and to execute a specified number of times per day.

Syntax

```
atmf backup {default|<hh:mm> frequency <1-24>}
no atmf backup enable
```

Parameter	Description
`default`	Restore the default backup schedule
`<hh:mm>`	Sets the time of day to apply the first backup, in hours and minutes. Note that this parameter uses the 24 hour clock
`backup`	Enables AMF backup to external media
`frequency <1-24>`	Sets the number of times per day that backups will be taken

Default Backups run daily at 03:00 AM, by default

Mode Global Configuration

Usage Running this command only configures the schedule. To enable the schedule, you should then apply the command **atmf backup enable** (or its "no" variant, to disable the schedule).

Examples To schedule backup requests to begin at 11 pm and execute daily, use the following command:

```
VCF_1# configure terminal
VCF_1(config)# atmf backup 23:00 frequency 1
```

Caution File names that comprise identical text, but with differing case, such as Test.txt and test.txt, will not be recognized a being different on a FAT32 based backup media such as a USB storage device. However, these filenames will be recognized as being different on your Linux based switch. Therefore, for good practice, ensure that you apply a consistent case structure for your back-up file names.

Related Commands

atmf backup enable
atmf backup stop
show atmf backup

atmf backup enable

This command enables automatic AMF backups on the AMF master node. By default, automatic backup starts at 3:00 AM, but this schedule can be changed by the **atmf backup** command on page 53. Note that backups are initiated and stored on the master nodes.

The no variant of this command will disable any amf backups that have been scheduled and previously enabled.

Syntax

```
atmf backup enable
no atmf backup enable
```

Parameter	Description
backup	The AMF backup process
enable	Enables AMF backup to external media

Default Automatic AMF backup functionality is enabled on the AMF master when it is configured and external media, i.e. an SD card or a USB storage device, is detected.

Mode Global Configuration

Usage A warning message will appear if you run the **atmf backup enable** command with either insufficient or marginal memory availability on your external storage device.

You can use the **show atmf backup** command on page 85 to check the amount of space available on your external storage device.

Examples To turn on automatic AMF backup, use the following command:

```
VCF_1# configure terminal
VCF_1(config)# atmf backup enable
```

Related Commands
show atmf
show atmf backup
atmf backup
atmf backup now
atmf enable

atmf backup now

This command is run only from an AMF master and initiates an immediate AMF backup of either all AMF members, or a selected AMF member. Note that this backup information is stored in the external media on the master nodes, even though the selected AMF member may not be a master node.

Syntax `atmf backup now [<nodename>]`

Parameter	Description
`backup`	The AMF backup process
`now`	Immediately applies the command's action
<nodename> *or* *<hostname>*	The name of the AMF member to be backed up - as set by the **hostname** command. Where no name has been assigned to this device, then you must apply the prefix, host underscore followed (without a space) by the MAC address of the device to be backed up. For example `host_0016_76b1_7a5e` Note that the node-name appear as the command Prompt when in Privileged Exec mode.

Default A backup is initiated for all nodes on the AMF (but stored on the master nodes).

Mode Privileged Exec

Usage Although this command will select the AMF node to be backed-up; it can only be run from an AMF master node. Note also that the backup produced will be for the selected node but the backed-up config will reside on the external media of the AMF master on which the command was run. However, this process will result in the information on one master being more up-to-date. To maintain concurrent backups on both masters, you can apply the backup now command to the master working-set. This is shown in **"Example 4"** on page 56.

Example 1 In this example, an AMF member has not been assigned a host name. The following command is run on the atmf_master_2 node to immediately backup the device - identified by its MAC address of 0016.76b1.7a5e:

```
atmf_master_2# atmf backup now host_0016_76b1_7a5e
```

Example 2 In this example, an AMF member has been assigned the host name, **office_annex**. The following command will immediately backup this device:.

```
atmf_master_2# atmf backup now office_annex
```

This command is initiated on the switch named **amf_master_2** and initiates an immediate backup on the switch named **office_annex**.

Example 3 To initiate (from the amf_master_1 node) an immediate backup of all AMF member nodes, use the following command:

```
amf_master_1# amf backup now
```

Example 4 To initiate an immediate backup of the node with the host-name “office_annex” and store the configuration on both masters, use the following process:

From the node amf_master_1, set the working-set to comprise only of the automatic group, master nodes.

```
amf_master_1# atmf working-set group master
```

This command returns the following display:

```
============================
atmf_master_1, atmf_master_2
============================

Working set join
```

Backup the AMF member with the host name, **office_annex** on both the master nodes as defined by the working set.

```
atmf_net[2]# atmf backup now office_annex
```

Note that the [2] shown in the command prompt indicates a 2 node working-set.

Related Commands

atmf backup
atmf backup stop
hostname
show atmf backup

atmf backup stop

Running this command will immediately stop a currently executing AMF backup. Note that this command can only be applied to the master node.

Syntax `atmf backup stop`

Parameter	Description
`backup`	The AMF backup process
`stop`	Immediately halts the running process

Mode Privileged Exec

Mode This command is used to halt an AMF backup that is in progress. In this situation the backup process will finish on its current node and then stop.

Examples To stop a backup that is currently executing:

```
VCF-1# amf backup stop
```

Related Commands
atmf backup
atmf backup enable
atmf backup now
show atmf backup

atmf domain vlan

The AMF domain vlan is one of the internal VLANs that are used to communicate information about the state of the AMF network between nodes. AMF uses its internal VLANS (the management VLAN and the domain VLAN) to communicate its inter nodal network status information. These VLANs must be reserved for AMF and not used for other purposes.

When an AMF network is first created all its nodes are assigned the default VID of 4091. This command enables you to change the VID from this default value.

If you assign a VLAN ID to this VLAN (i.e. change its value from the default of 4091) then you will need to do this separately on every device within the AMF. The AMF domain subnet will then be applied to this new VID when all devices within the AMF network are next rebooted.

The "no" variant of this command resets the VLAN ID to its default value of 4091.

Syntax

```
atmf domain vlan <2-4090>
no atmf domain vlan
```

Parameter	Description
`domain vlan`	The VLAN that is assigned (separately) to each domain within the AMF network.
<2-4090>	The VLAN number in the range 2 to 4090

Default The default domain VLAN ID for the AMF is 4091.

Mode Global Configuration

Usage When an AMF network is first created all its nodes are assigned a domain VLAN with a default VID of 4091. An important point conceptually is that although this VLAN then exists globally across the AMF network; it is assigned separately to each domain. The AMF network therefore can be thought of as comprising a series of domain VLANS each having the same VID and each being applied to a horizontal slice (domain) of the AMF. It follows therefore that the domain VLANs are only applied to ports that form cross-links and not to ports that form uplinks/downlinks.

The VLANs involved in this process, must be reserved for AMF and cannot be used for other purposes. This command enables you to change the domain VLAN to match your network's specific configuration.

Caution Setting this command, then rebooting the switch will only apply the AMF VLAN for the switch being configured. The new domain vlan will not become effective for the AMF network until all its member nodes have been updated, and all its member switches rebooted.

As part of its automatic creation process, this VLAN will also be assigned an IP subnet address based on the value configured by the **atmf management subnet** command on page 63. Refer to this command for more information.

Examples To change the AMF domain VLAN to 4000 use the following commands:

```
VCF-1# configure terminal
VCF-1(config)# atmf domain vlan 4000
```

To reset the AMF domain VLAN to its default of 4091, use the following commands:

```
VCF-1# configure terminal
VCF-1(config)# no atmf domain vlan
```

atmf enable

This command manually enables (turns on) the AMF feature for the switch being configured.

The “no” variant of this command disables (turns off) the AMF feature on the member node.

Syntax `atmf enable`

`no atmf enable`

Default Once AMF is configured, the AMF feature starts automatically when the switch starts up.

Mode Global Configuration

Usage Note that the switch does not auto negotiate AMF domain specific settings such as the Network Name. You should therefore, configure your switch with any domain specific (non default) settings before enabling AMF.

Example-1 To turn on the AMF the feature

```
MyNode# config terminal
MyNode(config)# atmf enable
```

Example-1 To turn off the AMF feature

```
MyNode(config)# no atmf enable
```

This command returns the following display:

```
% Warning: Write the config file. Enable will not become
effective until the unit reboots.

MyNode(config)#
```

atmf group (membership)

This command configures your switch to be a member of one or more AMF groups. Groups exist in three forms: Implicit Groups, Automatic Groups, and User-defined Groups.

- Implicit Groups
  - « all - All nodes in the AMF
  - « current - The current working-set
  - « local - The originating node.

  Note that the Implicit Groups do not appear in show group output.
- Automatic Groups - These are defined by hardware architecture. e.g x510, x610, x900, x8100.
- User Defined Groups - These enable you to define arbitrary groups of AMF members based on your own criteria.

Each node in the AMF is automatically assigned membership to the implicit groups, and the automatic groups that are appropriate to its node type, e.g. x610, PoE. Similarly, nodes that are configured as masters are automatically assigned to the master group.

Syntax

```
atmf group <group-list>
no atmf group <group-list>
```

Parameter	Description
`group`	An AMF group is a named collection of AMF nodes or modules. These definitions may be pre-existing and applied via hardware generated commands, or may be manually configured, changed, or removed. Group names are case sensitive and must be less than 64 characters long.
`<group-list>`	A list of group names. These should be entered as a comma delimited list without spaces.

Mode Global Configuration

Usage You can use this command to define your own arbitrary groups of AMF members based on your own network's configuration requirements. Applying a node to a non existing group will result in the group automatically being created.

Note that the master nodes are automatically assigned to be members of the pre-existing master group

The following example configures the switch to be members of three groups; two are company departments, and one comprises all devices located in building_2. To avoid having to run this command separately on each device that is to be added to these groups; you can remotely assign all of these devices to a working-set, then use the capabilities of the working-set to apply the **atmf group (membership)** command to all members of the working set.

Examples To specify the switch to be a member of AMF groups named, Marketing, Sales, and Building_2, use the following command:

```
VCF-1# configure terminal
VCF-1(config)# atmf group marketing,sales,building_2
```

Examples First add the nodes “master_node1” and “member_node_1” to the working-set:

```
master_node# atmf working-set master_node1,member_node_1
```

This command returns the following output confirming that the nodes “master_node” and “node_2” are now part of the working-set:

```
====================
master_node1, member_node_1
====================

Working set join
```

```
atmf-net[2]# configure terminal
```

Add the groups building1 and sales to the working-set

```
atmf-net[2](config)# atmf group building1,sales
atmf-net[2](config)# exit
```

Show the groups that are members of the working-set

```
atmf-net[2]# show atmf group
```

This command returns the following output displaying the groups that are members of the working-set.

```
====================
master_node1
====================

AMF group information

building1, sales, master, poe, x8100
```

Related Commands **show atmf group**
show atmf group members

atmf management subnet

This command is used to assign a subnet that will be allocated to the AMF management and domain management VLANs. From the address space defined by this command, two subnets are created, a management subnet component and a domain component, as explained in the Usage section of this command description.

AMF uses these internal IPv4 subnets when exchanging its internodal status packets. These subnet addresses must be reserved for AMF and should be used for no other purpose.

The new management subnet will not become effective until all members of the AMF network have been updated and all its units rebooted.

Syntax

```
atmf management subnet <a.b.0.0>
no atmf management subnet
```

Parameter	Description
`amf management subnet`	A subnet that is assigned for AMF management purposes.
`<a.b.0.0>`	The IP address selected for the management subnet. Because a mask of 255.255.0.0 (i.e. /16) will be applied automatically, an IP address in the format a.b.0.0 must be selected. Usually this subnet address is selected from an appropriate range from within the private address space of 172.16.0 to 172.31.255.255, or 192.168.0.0 as defined in RFC1918.

Default 172.31.0.0 (Note that a subnet mask of 255.255.0.0 will automatically be applied).

Mode Global Configuration

Usage Typically a network administrator would use this command to change the default subnet address to match local network requirements.

As previously mentioned, running this command will result in the creation of a further two subnets (within the class B address space assigned) and the mask will extend from /16 to /17.

For example, if the management subnet is assigned the address 172.31.0.0/16, this will result in the automatic creation of the following two subnets:

- 172.31.0.0/17 assigned to the **atmf management vlan**
- 172.31.128.0/17 assigned to the **atmf domain vlan**.

Examples To change the AMF management subnet address on node VCF-1 to 172.25.0.0:

```
VCF-1# configure terminal
VCF-1(config)# atmf management subnet 172.25.0.0
```

Examples To change the AMF management subnet address on node VCF-1 back to its default of 172.31.0.0:

```
VCF-1# configure terminal
VCF-1(config)# no atmf management subnet
```

atmf management vlan

The AMF management VLAN is created when the AMF network is first initiated and is assigned its default VID of 4092. This command enables you to change the VID from this default value.

The AMF management vlan is one of the internal VLANs that are used to communicate information about the state of the AMF network between nodes. AMF uses its internal VLANS (such as the management VLAN and the domain VLAN) to communicate its inter nodal network status information. These VLANs must be reserved for AMF and not used for other purposes.

If you assign a VLAN ID to this VLAN (i.e. change its value from the default of 4092) then you will need to do this separately on every device within the AMF. The AMF management subnet will then be applied to this new VID when all devices within the AMF network are next rebooted.

Syntax

```
atmf management vlan <2-4090>
no atmf management vlan
```

Parameter	Description
`atmf management vlan`	The VLAN that is assigned for AMF management.
`<2-4090>`	The VID assigned to the AMF management VLAN.

Default The default VLAN ID for the AMF is 4092.

Note Although the value applied by default lies outside the user configurable range. You can use the "no" form of this command to reset the VLAN to its default value.

Mode Global Configuration

Usage You can use this command to change the management VLAN to meet your network's requirements and standards, particularly in situations where the default address value is unacceptable.

Note This VLAN will automatically be assigned an IP subnet address based on the value configured by the **atmf management subnet** command on page 63. Refer to this command description for further details.

Examples To change the AMF management VLAN to 4090 use the following commands:

```
VCF-1# configure terminal
VCF-1(config)# atmf management vlan 4090
```

To reset the AMF domain VLAN to its default of 4092, use the following commands:

```
VCF-1# configure terminal
VCF-1(config)# no atmf management vlan
```

Related Commands **atmf domain vlan**
show atmf detail

atmf master

This command configures the switch to be an AMF master node and automatically creates an AMF master group. The master node is considered to be the core of the AMF network, and must be present for the AMF to form. The AMF master has its node depth set to 0.

An AMF master node must be present for an AMF network to form. Up to two AMF master nodes may exist in a network, and they "must" be connected by an AMF crosslink.

If the crosslink between two AMF masters goes down, then one of the masters will become isolated from the rest of the AMF network

The "no" variant of this command removes the switch as an AMF master node. The node will retain its node depth of 0 until the network is rebooted.

Note Node depth is the vertical distance (or level) from the master node (whose depth value is 0)

Syntax

```
atmf master
no atmf master
```

Default The switch is not configured to be an AMF master node.

Mode Global Configuration

Usage Using this command creates an AMF master group. Up to two AMF masters may be supported in a network, and they must be connected by an AMF crosslink. If the crosslink between two AMF masters fails, then one of the masters becomes isolated from the rest of the AMF network. A master node always has a distance value of 0.

Note Master nodes are an essential component of an AMF network. In order to run AMF, an AMF License is required for each master node.

Examples To specify that this node is an AMF master, use the following command:

```
VCF-1# configure terminal
VCF-1(config)# atmf master
```

Related Commands **show atmf**
show atmf group

atmf network-name

This command applies an AMF network name to a (prospective) AMF node. In order for an AMF network to be valid, its network-name must be configured on at least two nodes, one of which must be configured as a master and have an AMF License applied. These nodes may be connected using either AMF downlinks or crosslinks.

For more information on configuring an AMF master node see the **atmf master** command on page 67.

Syntax

```
atmf network-name <name>

no atmf network-name
```

Parameter	Description
`atmf`	The Allied Telesis Management Framework feature.
`network-name`	A name that is assigned to an AMF network
<name>	The AMF network name. Up to 15 printable characters can be entered for the network-name.

Mode Global Configuration

Usage This is one of the essential commands when configuring AMF and must be entered on each node that is to be part of the AMF. This command will not take effect until the particular node is rebooted.

A switching node (master or member) be a member of only one AMF network.

Caution **Ensure that you enter the correct network name. Entering an incorrect name will cause the AMF network to fragment (at the next reboot).**

Examples To set the AMF network name to amf_net use the command:

```
Node_1(config)# atmf network-name amf_net
```

atmf reboot-rolling

This command enables you to reboot the nodes in an AMF working-set, one at a time, as a rolling sequence in order to minimize downtime. Once a rebooted node has finished running its configuration and has brought its ports up it re-joins the AMF network and the next node is rebooted.

By adding the url parameter, you can also upgrade your switches' software one AMF node at a time.

The force command enforces a node reboot even if a previous node does not rejoin the AMF network. In this situation the unsuitable node will time-out and the rolling reboot process stops. However, with the **force** parameter applied, the process will ignore the timeout and move on to reboot the next node in the sequence.

This command can take a significant amount of time to complete.

Syntax `atmf reboot-rolling [force] [<url>]`

Parameter	Description
`atmf`	The Allied Telesis Management Framework feature.
`reboot-rolling`	Initiates the rolling reboot operation
`force`	Ignore a failed node and move on to the next node. Where a node fails to reboot a timeout is applied based on the time taken during the last reboot.
`<url>`	The url path to the software upgrade file.

Mode Privileged Exec

Usage You can load the software from a variety of locations. The latest compatible release for a node will be selected from your selected location - based on the parameters and URL you have entered.

For example card:/5.4.3/x*-5.4.3-*.rel will select from the folder card:/5.4.3 the latest file that matches the selection x (wildcard) -5.4.3-(wildcard).rel. Because x* is applied each switch type will be detected and its appropriate release file will be installed.

Other allowable entries are:

- card:*.rel:
  Used when loading SW from SD cards.
- tftp:ip address:
  Used when loading SW from a TFTP server.
- usb:
  Used when loading SW from a USB flash drive.
- flash:
  Used when loading SW from flash memory, i.e. from one x900 switch to another.
- scp
  Used when loading SW from a secure copy.
- http:
  Used when loading SW from an HTTP file server site.

Several checks are performed to ensure the upgrade will succeed. These include checking the current node release boots from flash. If there is enough space on flash, the software release is copied to flash to a new location on each node as it is processed. The new release name will updated using the "boot system <release-name>" command, and the old release will become the backup release file.

Note If you are using TFTP, HTTP, etc, to access a file on a remote device, then the URL should specify the exact release filename without using wild card characters.

On bootup the software release is verified. Should an upgrade fail, the upgrading unit will fail back to old software. At the completion of this command, a report is run showing the release upgrade status of each node.

This function is supported on the following switches: SBx908, SBx8100, x610, x510 and all stack configurations.

Note Take care when removing external media or rebooting your switches. Removing an external media while files are being written entails a significant risk of causing a file corruption.

Example-1 To reboot all x510 nodes in an AMF network, use the following commands

```
Bld2_Floor_1# atmf working-set group x510
```

This command returns the following type of screen output:

```
====================
node1, node2, node3:
====================

Working set join

AMF_NETWORK_Name[3]#
```

```
ATMF_NETWORK[3]# atmf reboot-rolling
```

When the reboot has completed, a number of status screens appear. The selection of these screens will depending on the parameters set.

```
Bld2_Floor_1#atmf working-set group x510

============================
SW_Team1, SW_Team2, SW_Team3:
============================

Working set join


ATMF_NETWORK[3]#atmf reboot-rolling
ATMF Rolling Reboot Nodes:

                     Timeout
Node Name            (Minutes)
--------------------------
SW_Team1                14
SW_Team2                 8
SW_Team3                 8
Continue the rolling reboot ? (y/n):y
================================================
ATMF Rolling Reboot: Rebooting SW_Team1
================================================

% SW_Team1 has left the working-set
Reboot of SW_Team1 has completed
================================================
ATMF Rolling Reboot: Rebooting SW_Team2
================================================

% SW_Team2 has left the working-set
Reboot of SW_Team2 has completed
================================================
ATMF Rolling Reboot: Rebooting SW_Team3
================================================

% SW_Team3 has left the working-set
Reboot of SW_Team3 has completed

================================================
ATMF Rolling Reboot Complete
Node Name           Reboot Status
---------------------------------
SW_Team1               Rebooted
SW_Team2               Rebooted
SW_Team3               Rebooted
================================================
```

Example-2 To update firmware releases, use the following command:

```
Node_1# atmf working-set group all
ATMF_NETWORK[9]# atmf reboot-rolling card:/5.4.3/x*-5.4.3-*.rel
```

.

```
ATMF Rolling Reboot Nodes:

                    Timeout
Node Name           (Minutes)    New Release File             Status
-------------------------------------------------------------------
SW_Team1               8         x510-5.4.3-0.5.rel           Release Ready
SW_Team2              10         x510-5.4.3-0.5.rel           Release Ready
SW_Team3               8         ---                          Not Supported
HW_Team1               6         ---                          Incompatible
Bld2_Floor_1           6         x900-5.4.3-0.5.rel           Release Ready
Bld1_Floor_2           2         x610-5.4.3-0.5.rel           Release Ready
Bld1_Floor_1           4         ---                          Incompatible
Building_1             2         ---                          Incompatible
Building_2             2         x900-5.4.3-0.5.rel           Release Ready
Continue upgrading releases ? (y/n):
```

atmf recover

This command is used to manually initiate the recovery (or replication) of an AMF node, usually when a node is being replaced. The recovery/replication process involves loading the configuration file for a node that is either about to be replaced or has experienced some problem. The configuration file of the device being replaced is selected by the nodename parameter, and the master node holding the config file is specified by the parameter <*master-nodename*>.

If the <*nodename*> parameter is not entered then the node will attempt to use one that has been previously configured. If the replacement node has no previous configuration (and has no previously used nodename), then the recovery will fail.

If the <*master-nodename*> parameter is not specified then the device will poll all known AMF masters and execute an election process (based on the last successful backup and its timestamp) to determine which master node to use. If no valid backup master is found, then this command will fail.

Syntax `atmf recover [<nodename> <master-nodename>]`

Parameter	Description
`atmf`	The Allied Telesis Management Framework feature.
`recover`	Initiates the manual node recovery process
<*nodename*>	The name of the device whose configuration is to be recovered or replicated.
<*master-nodename*>	The name of the master device that holds the required configuration information. Note that although you can omit both the nodename and the master nodename; you can only omit the master nodename if you also omit the nodename.

Mode Privileged Exec

Usage No error checking occurs when this command is run, and regardless of the last backup status, the recovering node will attempt to load its configuration from the master node specified by the master-nodename parameter.

Note that if the node has previously been configured, we recommend that you suspend any AMF backup before running this command. This is to prevent corruption of the backup files on the AMF master as it attempts to both backup and recover the node at the same time.

Examples To recover the AMF node named Node_10 from the AMF master node named Master_2, use the following command:

```
Master_2# atmf recover Node_10 Master_2
```

Related Commands **atmf backup stop**
show atmf backup
show atmf detail

atmf remote-login

Use this command to remotely login to other AMF nodes in order to run commands as if a local user of that node.

Syntax `atmf remote-login [user <name>] <nodename>`

Parameter	Description
`atmf`	The Allied Telesis Management Framework feature.
`remote-login`	Remote login.
`user`	User login
<name>	User name
<nodename>	Node name

Default Needs to be entered

Mode Privileged Exec (This command will only run at privilege level 15)

Usage You do not need a valid login on the local device in order to run this command. The session will take you to the enable prompt on the new device. If the remote login session exits for any reason (i.e device reboot) you will be returned to the originating node.

The software will not allow you to run multiple remote login sessions. You must exit an existing session before starting a new one.

Example-1 To remotely login from node Node10 to Node20 use the following command

```
Node10# atmf remote-login node20
```

Example-2 In this example, user Whitney is a valid user of node5. She can remotely login from node5 to node3 by using the following commands:

```
node5# atmf remote-login user whitney
       node3
Type 'exit' to return to node5#

node3> enable
```

Note In the above example the user name whitney is valid on both nodes.

Therefore, to prevent unauthorized access, user names should be unique across all nodes within the AMF network.

atmf working-set

The ATMF working-set command enables you to execute commands across an individually listed set (or preselected group) of AMF nodes. Group selection is made using the **atmf group (membership)** command on page 61.

This command opens a session on multiple network devices. When you change the working set to anything other than the local device, the prompt will change to the AMF network name, followed by the size of the working set, shown in square brackets. This command has to be run at privilege level 15.

In addition to the user defined groups, the following system assigned groups are automatically created:

- Implicit Groups
  - « all - All nodes in the AMF
  - « current - All nodes that comprise the current working-set
  - « local - The originating node.
- Automatic Groups - These can be defined by hardware architecture. i.e. x510, x610, x900, x8100, or by certain AMF nodal designations such as, master.

Note that the Implicit Groups do not appear in show group output.

If a node is an AMF master it will be automatically added to the master group.

Syntax

```
atmf working-set {[<node-list>][group{<group-list>|all|local|
   current}]}
```

Parameter	Description
`atmf`	The Allied Telesis Management Framework feature.
`working-set`	Defines the scope of the working set.
`<node-list>`	A comma delimited list (without spaces) of nodes to be included in the working-set
`group`	The AMF group
`<group-list>`	A comma delimited list (without spaces) of groups to be included in the working-set. Note that this can include either defined groups, or any of the Automatic, or Implicit Groups shown earlier in the bulleted list of groups.
`all`	All nodes in the AMF
`local`	Local node Running this command with the parameters **group local** will return you to the local prompt and local node connectivity.
`current`	Nodes in current list

Default Needs to be entered

Mode Privileged Exec

Example-1 To add all nodes in the AMF to the working-set, use the command:

```
node1# atmf working-set group all
```

Note This command adds the implicit group "all" to the working set; where "all" comprises all nodes in the AMF.

Displays an output screen similar to the one shown below:

```
=========================================
node1, node2, node3, node4, node5, node6:
=========================================

Working set join

ATMF_NETWORK_Name[6]#
```

Example-2 To return to the local prompt, and connectivity to only the local node; use the command:

```
ATMF_NETWORK_Name[6]# atmf working-set group local

node1#
```

Parameter definitions from the working-set command

Parameter	Definition
node1, node2 etc	The name of the nodes - as set by the **hostname** command.
ATMF_Network_Name	The name of the AMF network - as set by the **atmf network-name** command on page 68.
[6]	The number of nodes in the working-set.

clear atmf links statistics

This command resets the values of all AMF link, port, and global statistics to zero.

Syntax `clear atmf links statistics`

Mode Privilege Exec

Example To reset the AMF link statistics values, use the command:

```
node_1# clear atmf links statistics
```

Related Commands **show atmf links statistics**

debug atmf

This command enables the AMF debugging facilities, and displays information that is relevant (only) to the current node. The detail of the debugging displayed depends on the parameters specified.

If no additional parameters are specified, then the command output will display all AMF debugging information, including link events, topology discovery messages and all notable AMF events.

The "no" variant of this command disables either all AMF debugging information, or only the particular information as selected by the command's parameters.

Syntax

```
debug atmf [all|crosslink|database|link|neighbor|packet]
no debug atmf [all|crosslink|database|link|neighbor|packet]
```

Parameter	Description
`debug`	Enables the AMF debugging facility.
`all`	Output displays all events.
`crosslink`	Output displays all crosslink information.
`database`	Output displays only notable database events
`link`	Output displays debugging information relating to uplink or downlink information.
`neighbor`	Output displays only notable AMF neighbor events
`packet`	Output displays only notable AMF packet events

Default All debugging facilities are disabled.

Mode User Exec and Global Configuration

Usage If no additional parameters are specified, then the command output will display all AMF debugging information, including link events, topology discovery messages and all notable AMF events.

Note An alias to the no variant of this command - **undebug atmf** - exists elsewhere in this chapter.

Example To debug all AMF debugging, use the command:

```
node_1# debug atmf
```

To debug all AMF link debugging, use the command:

```
node_1# debug atmf link
```

To debug all AMF facilities, use the command:

```
node_1# debug atmf all
```

To debug all AMF packets, use the command:

```
node_1# debug atmf packet
```

Related Commands **no debug all**

show atmf

Displays information about the current AMF node.

Syntax `show atmf [detail|summary|tech|nodes|session]`

Parameter	Description
`detail`	Displays detailed information about the current AMF node.
`summary`	Displays summary information about the current AMF node.
`tech`	Displays global AMF information.
`nodes`	Displays information about AMF network nodes.
`session`	Displays information on an AMF session.

Default Only summary information is displayed.

Mode User Exec and Privileged Exec

Usage AMF uses internal VLANs to communicate between nodes about the state of the AMF network. Two VLANs have been selected specifically for this purpose. Once these have been assigned, they are reserved for AMF and cannot be used for other purposes

Example 1 To show summary information on AMF node_1 use the following command:

```
node_1 show atmf summary
```

The following figure shows some example output from running this command for a specific AMF node.

Figure 1-1: Output from the show atmf summary command

```
node_1#show atmf
ATMF Summary Information:

ATMF Status            : Enabled
Network Name           : ATMF_NET
Node Name              : node_1
Role                   : Master
Current ATMF Nodes     : 8
```

Example 2 To show detailed information on AMF node_1 use the following command:

```
node_1 show atmf detail
```

Figure 1-2: Output from the show atmf detail command

```
node_1#show atmf detail
ATMF Detail Information

Network Name                        : ATMF_NET
Node Name                           : node_1
Node Address                        : node_1.atmf
Node ID                             : 1
Node Depth                          : 0
Domain State                        : DomainController
Recovery State                      : None

Management VLAN
 VLAN ID                            : 4092
 Management Subnet                  : 172.31.0.0
 Management IP Address              : 172.31.0.1
 Management Mask                    : 255.255.128.0

Domain VLAN
 VLAN ID                            : 4091
 Domain Subnet                      : 172.31.128.0
 Domain IP Address                  : 172.31.128.1
 Domain Mask                        : 255.255.128.0
```

Example 3 To show information specific to AMF nodes use the following command:

```
node_1 show atmf nodes
```

Figure 1-3: Output from the show atmf nodes command

```
Node Information:

  * = Local device

 SC = Switch Configuration:
  C = Chassis    S = Stackable    N = Standalone

  Node                Device             AMF                              Node
  Name                Type               Master  SC  Parent                Depth
-------------------------------------------------------------------------------
  Building_1          AT-SBx8112           Y     C   -                       0
* Building_2          x900-12XT/S          Y     N   -                       0
  Bld1_Floor_1        SwitchBlade x908     N     S   Building_1              1
  Bld1_Floor_2        x600-24Ts/XP         N     N   Building_1              1
  Bld2_Floor_1        x610-24Ts-POE+       N     N   Building_1              1
  SW_Team1            x510-28GPX           N     N   Bld1_Floor_2            2

 Current AMF node count 8
```

The show AMF session command displays all CLI (Command Line Interface) sessions for users that are currently logged in and running a CLI session. For example, in the case below, node_1 and node5 have active users logged in.

Example 4 To display AMF active sessions, use the following command

```
node_1 show atmf sessions
```

Figure 1-4: Output from the show atmf sessions command

```
node_1#show atmf session

CLI Session Neighbors

Session ID                              : 73518
Node Name                               : node_1
PID                                     : 7982
Link type                               : Broadcast-cli
MAC Address                             : 0000.0000.0000
Options                                 : 0
Our bits                                : 0
Link State                              : Full
Domain Controller                       : 0
Backup Domain Controller                : 0
Database Description Sequence Number    : 00000000
First Adjacency                         : 1
Number Events                           : 0
DBE Retransmit Queue Length             : 0
DBE Request List Length                 : 0

Session ID                              : 410804
Node Name                               : node5
PID                                     : 17588
Link type                               : Broadcast-cli
MAC Address                             : 001a.eb56.9020
Options                                 : 0
Our bits                                : 0
Link State                              : Full
Domain Controller                       : 0
Backup Domain Controller                : 0
Database Description Sequence Number    : 00000000
First Adjacency                         : 1
Number Events                           : 0
DBE Retransmit Queue Length             : 0
DBE Request List Length                 : 0
```

The AMF tech command collects all the AMF commands, and displays them. You can use this command when you want to see an overview of the AMF network.

Example 5 To display AMF technical information, use the following command:

```
node_1 show atmf tech
```

Figure 1-5: Output from the show atmf nodes command

```
node_1#show atmf tech
ATMF Summary Information:

ATMF Status            : Enabled
Network Name           : ATMF_NET
Node Name              : node_1
Role                   : Master
Current ATMF Nodes     : 8

ATMF Technical information:

Network Name                        : ATMF_NET
Domain                              : node_1's domain
Node Depth                          : 0
Domain Flags                        : 0
Authentication Type                 : 0
MAC Address                         : 0014.2299.137d
Board ID                            : 287
Domain State                        : DomainController
Domain Controller                   : node_1
Backup Domain Controller            : node2
Domain controller MAC               : 0014.2299.137d
Parent Domain                       : -
Parent Domain Controller            : -
Parent Domain Controller MAC        : 0000.0000.0000
Number of Domain Events             : 0
Crosslink Ports Blocking            : 0
Uplink Ports Waiting on Sync        : 0
Crosslink Sequence Number           : 7
Domains Sequence Number             : 28
Uplink Sequence Number              : 2
Number of Crosslink Ports           : 1
Number of Domain Nodes              : 2
Number of Neighbors                 : 5
Number of Non Broadcast Neighbors   : 3
Number of Link State Entries        : 1
Number of Up Uplinks                : 0
Number of Up Uplinks on This Node   : 0
DBE Checksum                        : 84fc6
Number of DBE Entries               : 0
Management Domain Ifindex           : 4391
Management Domain VLAN              : 4091
Management ifindex                  : 4392
Management VLAN                     : 4092
```

Table 1-1: Parameter definitions from the show atmf command

Parameter	Definition
ATMF Status	The Node's AMF status, either Enabled or Disabled.
Network Name	The AMF network that a particular node belongs to.
Node Name	The name assigned to a particular node.
Role	The role configured for this AMF device, either Master or Member.
Current ATMF Nodes	The count of AMF nodes in an AMF Network.
Node Address	An Address used to access a remotely located node (.atmf).

Table 1-1: Parameter definitions from the show atmf command (cont'd)

Parameter	Definition
Node ID	A Unique identifier assigned to a Node on an AMF network.
Node Depth	The number of nodes in path from this node to level of the AMF root node. It can be thought of as the vertical depth of the ATMF network from a particular node to the zero level of the ATMF root node.
Domain State	The state of Node in a Domain in AMF network as Controller/Backup.
Recovery State	The AMF node recovery status. Indicates whether a node recovery is in progress on this device - Auto, Manual, or None.
Management VLAN	The VLAN created for traffic between Nodes of different domain (up/down links). ■ VLAN ID - In this example VLAN 4092 is configured as the Management VLAN. ■ Management Subnet - Network prefix for the subnet. ■ Management IP Address - The IP address allocated for this traffic. ■ Management Mask - The subnet mask used to create a subnet for this traffic (255.255.128.0).
Domain VLAN	The VLAN assigned for traffic between Nodes of same domain (crosslink). ■ VLAN ID - In this example VLAN 4091 is configured as the domain VLAN. ■ Domain Subnet. The subnet address used for this traffic. ■ Domain IP Address. The IP address allocated for this traffic. ■ Domain Mask. The subnet mask used to create a subnet for this traffic (255.255.128.0).
Device Type	The Product Series Name.
ATMF Master	The 'Y' if the node belongs to a Core domain.
SC	The Switch Configuration, C - Chassis(SBx81series), S - Stackable (VCS) and N - Standalone.
Parent	The a Node to which the current node has an active uplink.
Node Depth	The the number of nodes in path from this node to the Core domain.

Note

You can manage your show output, or make it a more selective, by using a command modifier. For information on using show-command modifiers, see **"Controlling "show" Command Output"** on page 51.

show atmf backup

This command displays information about AMF backup status.

Syntax `show atmf backup {logs]`

Parameter	Description
`backup`	The backup configuration
`logs`	Displays detailed log information

Mode User Exec - Privilege level 15

Examples To display the AMF backup information, use the command:

```
node_1# show atmf backup
```

```
Node_1# show atmf backup
ScheduledBackup ......Enabled
  Schedule.............1 per day starting at 03:00
  Next Backup Time....19 May 2012 03:00
Backup Media..........SD (Total 1974.0 MB, Free197.6MB)
Current Action........Starting manual backup
Started...............18 May 2012 10:08
CurrentNode...........atmf_testbox1

Node Name                          Date          Time       In ATMF     Status
-------------------------------------------------------------------------------
atmf_testbox1                       17May  2012  09:58:59  Yes         Errors
atmf_testbox2                       17May  2012  10:01:23  Yes         Good

Node_1#show atmf backup logs

Log File Location: card:/atmf/office1/logs/rsync_<nodename>.log

Node
Name Log Details-------------------------------------------------------------------
atmf_testbox2
      2012/05/22 03:41:32 [30299]File list size: 6199
      2012/05/22 03:41:32 [30299]File list generation time: 0.011 seconds
      2012/05/22 03:41:32 [30299]File list transfer time: 0.000 seconds
      2012/05/22 03:41:32 [30299]Total bytes sent: 696
      2012/05/22 03:41:32 [30299]Total bytes received: 16.03K
      2012/02/20 03:41:32 [30299]sent 696 bytes rece ived 16.03Kbytes 33.45 K
      bytes/sec
      2012/05/22 03:41:32 [30299]total size is 21.73M speedup is 1298.93
      2012/05/22 03:41:32 [30297]sent 626 bytes received 6203 bytes total
      size 43451648
```

Figure 1-6: Parameter definitions from the show atmf backup command

Parameter	Definition
`Scheduled Backup`	Indicates whether AMF backup scheduling is enabled or disabled.
`Schedule`	Displays the configured backup schedule.
`Next Backup Time`	Displays the date and time of the next scheduled.
`Backup Media`	The current backup medium in use. This will be one of USB, SD, or NONE. Note that the USB will take precedence over the SD card. Utilized and available memory (MB) will be indicated if backup media memory is present.

Figure 1-6: Parameter definitions from the show atmf backup command (cont'd)

Parameter	Definition
`Current Action`	The task that the AMF backup mechanism is currently performing. This will be a combination of either (Idle, Starting, Doing, Stopping), or (manual, scheduled).
`Started`	The date and time that the currently executing task was initiated in the format DD MMM YYYY.
`Current Node`	The name of the node that is currently being backed up.
`Node Name`	The name of the node that is storing backup data - on its backup media.
`Date`	The data of the last backup in the format DD MMM YYYY.
`Time`	The time of the last backup in the format HH:MM:SS.
`In ATMF`	Whether the node shown is active in the AMF network, (Yes or No).
`Status`	The output can contain one of four values: ■ "-" meaning that the status file cannot be found or cannot be read. ■ "Errors" meaning that there are issues - note that the backup may still be deemed successful depending on the errors. ■ "Stopped" meaning that the backup attempt was manually aborted;. ■ "Good" meaning that the backup was completed successfully.
`Log File Location`	All backup attempts will generate a result log file in the identified directory based on the node name. In the above example this would be: card:/amf/office/logs/rsync_amf_testbox1.log.
`Log Details`	The contents of the backup log file.

Note

You can manage your show output, or make it a more selective, by using a command modifier. For information on using show-command modifiers, see **"Controlling "show" Command Output"** on page 51.

Related Commands **show atmf**
atmf network-name

show atmf group

This command can be used to display the group membership within to a particular AMF node. It can also be used with the working-set command to display group membership within a working set.

Each node in the AMF is automatically added to the group that is appropriate to its hardware architecture. e.g x510, x610. Nodes that are configured as masters are automatically assigned to the master group.

You can create arbitrary groups of AMF members based on your own selection criteria. You can then assign commands collectively to any of these groups.

Syntax `show atmf group [user-defined|automatic]`

Parameter	Description
`group`	The amf group
`user-defined`	User-defined-group information display
`automatic`	Automatic group information display

Default All groups are displayed

Mode User Exec - Privilege level 15

Example-1 To display group membership of node2, use the following command:

```
node2# show atmf group
```

A typical output screen from this command is shown below:

```
ATMF goup information
master, x510
node2#
```

This screen shows that node2 contains the groups, master and x510. Note that although the node also contains the implicit groups, these do not appear in the show output.

Example-2 The following commands (entered on node2) will display all the automatic groups within the working set containing node-1 and all nodes that have been pre-defined to contain the sysadmin group:

First define the working-set

```
Node-1# #atmf working-set node-1 group sysadmin
```

A typical output screen from this command is shown below:

```
ATMF group information

master, poe, x8100


=======================================
node-1, node-2, node3, node-4, node-5, node-6:
=======================================

ATMF group information

sysadmin, x8100

ATMF_NETWORK[6]#
```

This confirms that the six nodes (node-1 to node-6) are now members of the working-set and that these nodes reside within the ATMF_Network.

Note that to run this command, you must have previously entered the **atmf working-set** command on page 75. This can be seen from the network level prompt, which in this case is ATMF_NETWORK[6]#.

Figure 1-7: Sample output from the show atmf group command for a working set.

```
ATMF_NETWORK[6]#show atmf group
=========================
node3, node4, node5, node6:
=========================

ATMF group information

edge_switches, x510
```

Figure 1-8: Parameter definitions from the show atmf group command

Parameter	Definition
`ATMF group information`	Displays a list of nodes and the groups that they belong to, for example: ■ master - Shows a common group name for Nodes configured as AMF masters. ■ Hardware Arch - Shows a group for all Nodes sharing a common Hardware architecture: e.g: x8100, x900, x610 etc. ■ User-defined - Arbitrary groups created by the user for AMF nodes.

show atmf group members

This command will display all group memberships within an AMF working-set. Each node in the AMF working set is automatically added to automatic groups which are defined by hardware architecture. e.g x510, x610. Nodes that are configured as masters are automatically assigned to the master group. User can define arbitrary groupings of AMF members based on their own criteria, which can be used to select groups of nodes.

Syntax `show atmf group members [user-defined|automatic]`

Parameter	Description
`group`	The AMF group
`members`	AMF group members
`user-defined`	User defined group membership display
`automatic`	Automatic group membership display

Mode User Exec - Privilege level 15

Examples To display group membership of all nodes in a working-set, use the command:

```
ATMF_NETWORK[9]# show atmf group members
```

Figure 1-9: Sample output from the show atmf group members command.

```
ATMF Group membership


Automatic         Total
Groups            Members    Members
-------------------------------------------------------------------------------
master            1          Building_1
poe               1          HW_Team1
x510              3          SW_Team1 SW_Team2 SW_Team3
x900              1          Bld1_Floor_2
x610              1          HW_Team1
x8100             2          Building_1 Building_2


ATMF Group membership

User-defined      Total
Groups            Members    Members
-------------------------------------------------------------------------------
marketing           1        Bld1_Floor_1
software            3        SW_Team1 SW_Team2 SW_Team3
```

Figure 1-10: Parameter definitions from the show atmf group command

Parameter	Definition
`Automatic Groups`	Lists the Automatic Groups and their nodal composition. The sample output shows AMF nodes based on same Hardware type or belonging to same Master group.
`User-defined Groups`	Shows grouping of AMF nodes in user defined groups.
`Total Members`	Shows the total number of members in each group.
`Members`	Shows the list of AMF Nodes in each group.

Related Commands

show atmf group
show atmf
atmf group (membership)

show atmf links brief

This commands display brief information about all the AMF links configured on the selected node.

Syntax `show atmf links [brief]`

Parameter	Description
`links`	AMF links
`brief`	Brief summary of AMF links configuration and status

Mode User Exec and Privileged Exec

Example To display the AMF links brief details, use one of the following commands:

```
Building_2# show atmf links
Building_2# show atmf links brief
```

Figure 1-11: Sample output from the show atmf links brief command.

```
ATMF  Links Brief:

Local    Link      Port    ATMF         Adjacent             Adjacent Link
Port     Type      Status  State        Node                 Ifindex  State
-------------------------------------------------------------------------
sa1      Crosslink Up      TwoWay       Building_1           4501     Forwarding
1.0.1    Downlink  Up      Full         Bld1_Floor_1         5001     Forwarding
1.0.2    Downlink  Up      Full         Bld1_Floor_2         5003     Forwarding
1.0.3    Downlink  Up      Full         Bld2_Floor_1         6101     Forwarding
```

Figure 1-12: Parameter definitions from the show atmf links detail command

Parameter	Definition
`Local Port`	Shows local port on the Node configured for AMF Network.
`Link Type`	Shows link type as Uplink/Downlink (Parent and child) or Cross-link (Nodes in same domain).
`Port Status`	Shows status of the local port on the Node as UP/DOWN.
`ATMF State`	Shows AMF state of the local port: ■ Init - Link is down. ■ Hold - Link transitioned to up state, but waiting for hold period to ensure link is stable. ■ Incompatible - Neighbor rejected the link because of inconsistency in AMF configurations. ■ OneWay - Link is up and has waited the hold down period and now attempting to link to ■ another unit in another domain ■ Full - Link hello packets are sent and received from its neighbor with its own node id. ■ Shutdown - Link has been shut down by user configuration.
`Adjacent Node`	Shows Adjacent AMF Node to this Node.
`Adjacent IfIndex`	Shows interface on the Adjacent AMF Node connected to this Node.
`Link State`	Shows state of AMF link Forwarding/Blocking.

Note

You can manage your show output, or make it a more selective, by using a command modifier. For information on using show-command modifiers, see **"Controlling "show" Command Output"** on page 51.

Related Commands

no debug all
clear atmf links statistics
clear atmf links statistics
show atmf

show atmf links detail

By default, the following commands display various levels of detail about all the AMF links configured on the device and also display detailed statistics about the AMF packet exchanges between the devices.

It is also possible to display the AMF link configuration and packet exchange statistics for a specified interface.

Syntax `show atmf links detail`

Parameter	Description
`links`	AMF links
`brief`	Brief summary of AMF links configuration and status
`detail`	Detailed AMF links information

Mode User Exec.

Example To display the AMF link details use this command

```
node_1# show atmf links detail
```

The output from this command will display all the internal data held for ATMF links.

Figure 1-13: Sample output from the show atmf links detail command.

```
ATMF  Links Detail:

Port                                : sa1
Ifindex                             : 4501
VR ID                               : 0
Port Status                         : Up
Port State                          : Full
Port BPDU Receive Count             : 44441
Adjacent Node Name                  : Building_2
Adjacent Ifindex                    : 4501
Adjacent VR ID                      : 0
Adjacent MAC                        : 0014.2299.137d
Port Last Message Response          : 0
```

Figure 1-13: Sample output from the show atmf links detail command. (cont'd)

```
Port                                : port2.0.2
Ifindex                             : 6002
VR ID                               : 0
Port Status                         : Down
Port State                          : Init
Port BPDU Receive Count             : 0

Link State Entries:

Node.Ifindex                        : Building_2.4501 - Building_1.4501
Transaction ID                      : 3 - 3
MAC Address                         : 0014.2299.137d - eccd.6d03.10e3
Link State                          : Full - Full

Domain Nodes Tree:

Node                              : Building_2
  Links on Node                   : 1
  Link 0                          : Building_2.4501 - Building_1.4501
  Forwarding State                : Forwarding
Node                              : Building_1
  Links on Node                   : 1
  Link 0                          : Building_2.4501 - Building_1.4501
  Forwarding State                : Forwarding
```

```
Crosslink Transaction Entries:

Node                              : Building_2
Transaction ID                    : 3
Uplink Transaction ID             : 3
Uplink Information:

Waiting for Sync                  : 0
Transaction ID                    : 3
Number of Links                   : 0
Number of Local Uplinks           : 0
```

```
Uplink Information:

Waiting for Sync                    : 0
Transaction ID                      : 3
Number of Links                     : 0
Number of Local Uplinks             : 0

Originating Node                    : Building_2
Domain                              : -'s domain
Node                                : Building_2
Ifindex                             : 0
VR ID                               : 0
Transaction ID                      : 3
Flags                               : 32
Domain Controller                   : -
Domain Controller MAC               : 0000.0000.0000
```

Figure 1-13: Sample output from the show atmf links detail command. (cont'd)

```
Downlink Domain Information:

Domain                                : Bld2_Floor_1's domain
  Domain Controller                   : Bld2_Floor_1
  Domain Controller MAC               : eccd.6d3f.fef7
  Number of Links                     : 2
  Number of Links Up                  : 2
  Number of Links on This Node        : 1
  Links are Blocked                   : 0
  Node Transaction List
    Node                              : Building_2
    Transaction ID                    : 7
  Domain List
    Domain                            : Bld2_Floor_1's domain
      Node                            : Building_2
      Ifindex                         : 5002
      Transaction ID                  : 7
      Flags                           : 1

    Domain                            : Bld2_Floor_1's domain
      Node                            : Building_1
      Ifindex                         : 7002
      Transaction ID                  : 7
      Flags                           : 1
```

```
------------------------------------------------------------------------------
Up/Downlink Ports Information
------------------------------------------------------------------------------
Port                                  : port1.3.1
Ifindex                               : 7001
VR ID                                 : 0
Port Status                           : Up
Port State                            : Full
Adjacent Node                         : Bld1_Floor_1
Adjacent Internal ID                  : 4
Adjacent Ifindex                      : 6001
Adjacent Board ID                     : 290
Adjacent VR ID                        : 0
Adjacent MAC                          : 0000.cd37.0ea4
Adjacent Domain Controller            : Bld1_Floor_1
Adjacent Domain Controller MAC        : 0000.cd37.0ea4
Port Forwarding State                 : Blocking
Port BPDU Receive Count               : 0
Port Sequence Number                  : 12
Port Adjacent Sequence Number         : 9
Port Last Message Response            : 0
```

```
Port                                  : port1.3.2
Ifindex                               : 7002
VR ID                                 : 0
Port Status                           : Up
Port State                            : Full
Adjacent Node                         : Bld2_Floor_1
Adjacent Internal ID                  : 3
Adjacent Ifindex                      : 5001
Adjacent Board ID                     : 333
Adjacent VR ID                        : 0
Adjacent MAC                          : eccd.6d3f.fef7
Adjacent Domain Controller            : Bld2_Floor_1
Adjacent Domain Controller MAC        : eccd.6d3f.fef7
Port Forwarding State                 : Blocking
Port BPDU Receive Count               : 0
Port Sequence Number                  : 15
Port Adjacent Sequence Number         : 8
Port Last Message Response            : 0
```

Figure 1-14: Parameter definitions from the show atmf links detail command

Parameter	Definition
`Local Port`	Shows local port on the Node configured for AMF Network.
`Link Type`	Shows link type as Uplink/Downlink (Parent and child) or Cross-link (Nodes in same domain).
`Port Status`	Shows status of the local port on the Node as UP/DOWN.
`ATMF State`	Shows AMF state of the local port: ■ Init - Link is down. ■ Hold - Link transitioned to up state, but waiting for hold period to ensure link is stable. ■ Incompatible - Neighbor rejected the link because of inconsistency in AMF configurations. ■ OneWay - Link is up and has waited the hold down period and now attempting to link to ■ another unit in another domain ■ Full - Link hello packets are sent and received from its neighbor with its own node id. ■ Shutdown - Link has been shut down by user configuration.
`Adjacent Node`	Shows Adjacent ATMF Node to this Node.
`Adjacent IfIndex`	Shows interface on the Adjacent AMF Node connected to this Node.
`Link State`	Shows state of AMF link Forwarding/Blocking.
`Crosslink Ports Information`	Show details of all Crosslink ports on this Node: ■ Port - Name of the Port or static aggregation (sa<*>). ■ Ifindex - Interface index for the crosslink port. ■ VR ID - Virtual router id for the crosslink port. ■ Port Status - Shows status of the local port on the Node as UP/DOWN. ■ Port State - Same as AMF state as described above. ■ Port BPDU Receive Count - The number of AMF protocol PDU's received. ■ Adjacent Node Name - Name of the adjacent node in the domain. ■ Adjacent Ifindex - Ifindex of the adjacent node in the domain. ■ Adjacent VR ID - Virtual router id of the adjacent node in the domain. ■ Adjacent MAC - MAC address of the adjacent node in the domain. ■ Port Last Message Response - Response from the remote neighbor to our AMF last hello packet.
`Link State Entries`	Show all the link state database entries: ■ Node.Ifindex - Shows adjacent Node names and Interface index. ■ Transaction ID - Shows transaction id of the current crosslink transaction. ■ MAC Address - Shows adjacent Node MAC addresses. ■ Link State - Shows AMF states of adjacent nodes on the link.
`Domain Nodes Tree`	Shows all the nodes in the domain: ■ Node - Name of the node in the domain. ■ Links on Node - Number of crosslinks on a vertex/node. ■ Link no - Shows adjacent Node names and Interface index. ■ Forwarding State - Shows state of AMF link Forwarding/Blocking.
`Crosslink Transaction Entries`	Shows all the transaction entries: ■ Node - Name of the AMF node. ■ Transaction ID - transaction id of the node. ■ Uplink Transaction ID - transaction id of the remote node.

Figure 1-14: Parameter definitions from the show atmf links detail command (cont'd)

Parameter	Definition
`Uplink Information`	Show all uplink entries. ■ Waiting for Sync - Flag if uplinks are currently waiting for synchronization. ■ Transaction ID - Shows transaction id of the local node. ■ Number of Links - Number of up downlinks in the domain. ■ Number of Local Uplinks - Number of uplinks on this node to the parent domain. ■ Originating Node - Node originating the uplink information. ■ Domain - Name of the parent uplink domain. ■ Node - Name of the node in the parent domain, that is connected to the current domain. ■ Ifindex - Interface index of the parent node's link to the current domain. ■ VR ID - Virtual router id of the parent node's link to the current domain. ■ Transaction ID - Transaction identifier for the neighbor in crosslink. ■ Flags - Used in domain messages to exchange the state: ■ATMF_DOMAIN_FLAG_DOWN = 0 ■ATMF_DOMAIN_FLAG_UP = 1 ■ATMF_DOMAIN_FLAG_BLOCK = 2 ■ATMF_DOMAIN_FLAG_NOT_PRESENT = 4 ■ATMF_DOMAIN_FLAG_NO_NODE = 8 ■ATMF_DOMAIN_FLAG_NOT_ACTIVE_PARENT = 16 ■ATMF_DOMAIN_FLAG_NOT_LINKS = 32 ■ATMF_DOMAIN_FLAG_NO_CONFIG = 64 ■ Domain Controller - Domain Controller in the uplink domain ■ Domain Controller MAC - MAC address of Domain Controller in uplink domain
`Downlink Domain Information`	Shows all the downlink entries: ■ Domain - Name of the downlink domain. ■ Domain Controller - Controller of the downlink domain. ■ Domain Controller MAC - MAC address of the domain controller. ■ Number of Links - Total number of links to this domain from the Node. ■ Number of Links Up - Total number of links that are in UP state. ■ Number of Links on This Node - Number of links terminating on this node. ■ Links are Blocked - 0 links are not blocked to the domain. 1 All links are blocked to the domain.
`Node Transaction List`	List of transactions from this downlink domain node. ■ Node - 0 links are not blocked to the domain. 1 All links are blocked to the domain. ■ Transaction ID - Transaction id for this node. ■ Domain List : Shows list of nodes in the current domain and their links to the downlink domain.: ■ Domain - Domain name of the downlink node. ■ Node - Name of the node in the current domain. ■ Ifindex - Interface index for the link from the node to the downlink domain. ■ Transaction ID - Transaction id of the node in the current domain. ■ Flags - As mentioned above.

Figure 1-14: Parameter definitions from the show atmf links detail command (cont'd)

Parameter	Definition
`Up/Downlink Ports Information`	Shows all the configured up and down link ports on this node: ■ Port - Name of the local port. ■ Ifindex - Interface index of the local port. ■ VR ID - Virtual router id for the local port. ■ Port Status - Shows status of the local port on the Node as UP/DOWN. ■ Port State - AMF state of the local port. ■ Adjacent Node - Node name of the adjacent node. ■ Adjacent Internal ID - Unique node identifier of the remote node. ■ Adjacent Ifindex - Interface index for the port of adjacent AMF node. ■ Adjacent Board ID - Product identifier for the adjacent node. ■ Adjacent VR ID - Virtual router id for the port on adjacent AMF node. ■ Adjacent MAC - MAC address for the port on adjacent AMF node. ■ Adjacent Domain Controller - Node name of the Domain controller for Adjacent AMF node. ■ Adjacent Domain Controller MAC - MAC address of the Domain controller for Adjacent AMF node. ■ Port Forwarding State - Local port forwarding state Forwarding or Blocking. ■ Port BPDU Receive Count - Count of AMF protocol PDU's received. ■ Port Sequence Number - hello sequence number, incremented every time the data in the hello packet changes. ■ Port Adjacent Sequence Number - remote ends sequence number used to check if we need to process this packet or just note it arrived. ■ Port Last Message Response - response from the remote neighbor to our last hello packet.

Note

You can manage your show output, or make it a more selective, by using a command modifier. For information on using show-command modifiers, see **"Controlling "show" Command Output"** on page 51.

Related Commands

no debug all
clear atmf links statistics
clear atmf links statistics
show atmf

show atmf links statistics

By default, the following commands display various levels of detail about all the AMF links configured on the device and also display detailed statistics about the AMF packet exchanges between the devices.

It is also possible to display the AMF link configuration and packet exchange statistics for a specified interface.

Syntax `show atmf links statistics [interface [ifrange]]`

Parameter	Description
`links`	AMF links
`statistics`	AMF statistics
`interface`	Interface information
`ifrange`	Interface range

Mode User Exec.

Example -1 To display AMF link statistics, use the command:

```
node_1# show atmf links statistics interface port1.0.5
```

Figure 1-15: Sample output from the show atmf links statistics command.

```
ATMF Statistics:

                                    Receive          Transmit
---------------------------------------------------------------
Crosslink Hello                       7                14
Crosslink Hello Domain                18               38
Crosslink Hello Uplink                3                12
Hello Link                            32               31
Hello Neighbor                        55               57
Hello Stack                           0                0
Database Description                  12               112
Database Request                      5                4
Database Reply                        0                5
Database Update                       35               9
Database Update Bitmap                0                10
Database Acknowlegde                  112              74
Transmit Fails                        0                0
Discards                              0                0
Total AMF Packets                     300              366

ATMF Database Statistics:

Database Entries                      18
Database Full Ages                    0

ATMF Packet Discards:

Type0       0             Type1       0             Type2       0
Type3       0             Type4       0             Type5       0
Type6       0             Type7       0             Type8       0
Type9       0             Type10      0             Type11      0
Type12      0             Type13      0             Type14      0
Type15      0             Type16      0             Type17      0
Type18      0             Type19      0             Type20      0
```

Example -2 To display the AMF links statistics on interface port1.0.5, use the command:

```
node_1# show atmf links statistics interface
        port1.0.5
```

Figure 1-16: Sample output from the show atmf links statistics command for interface 1.0.5.

```
ATMF Port Statistics:

                                                  Receive
Transmit
port1.0.5  Crosslink Hello                        231             232
port1.0.5  Crosslink Hello Domain                 116             116
port1.0.5  Crosslink Hello Uplink                 116             115
port1.0.5  Hello Link                             0               0
```

Figure 1-17: Parameter definitions from the show atmf links statistics command

Parameter	Definition
`Receive`	Shows count of ATMF Protocol Packets received per message type.
`Transmit`	Shows the number of ATMF Protocol Packets transmitted per message type.
`Database Entries`	Shows number of ATMF elements existing in the distributed database.
`Database Full Ages`	Shows number of times the entries Aged in the database.
`ATMF Packet Discards`	Shows the number of discarded packets of each type: ■ Type0: The number of discarded crosslink hello msgs received on a non crosslink port. ■ Type1: The number of discarded tx update packets - bad checksum. ■ Type2: The number of discarded tx update bitmap packets - bad checksum. ■ Type3: The number of discarded tx update packets - neighbor not in the correct state. ■ Type4: The number of discarded update packets - bad checksum. ■ Type5: The number of discarded update packets - neighbor not in the correct state. ■ Type6: The number of discarded update bitmap packets - bad checksum. ■ Type7: The number of discarded crosslink hello msgs received ona non crosslink port. ■ Type8: The number of discarded crosslink hello msg received on a port that is not in the correct state. ■ Type9: The number of discarded crosslink domain hello msgs received on a non crosslink port. ■ Type10: The number of discarded crosslink domain hello msgs received on a port that is not in the correct state. ■ Type11: The number of crosslink uplink hello msgs received on a non crosslink port. ■ Type12: The number of discarded crosslink uplink hello msgs ignored on a port that is not in the correct state. ■ Type13: The number of messages with an incorrect name for this ATMF network. ■ Type14: The number of over-long packets received on a port. ■ Type15: The number of messages with a bad protocol version received on a port. ■ Type16: The number of messages with a bad packet checksum calculation received on a port. ■ Type17: The number of messages with a bad authentication type received on a port. ■ Type18: The number of messages with a bad simple password received on a port. ■ Type19: The number of discarded packets with an unsupported authentication type received on a port. ■ Type20: The number of discarded packets with an unknown neighbor received on a port.

Note You can manage your show output, or make it a more selective, by using a command modifier. For information on using show-command modifiers, see **"Controlling "show" Command Output"** on page 51.

Related Commands

no debug all
clear atmf links statistics
clear atmf links statistics
show atmf

show atmf working-set

This command displays the nodes that form the current AMF working-set

Syntax `show atmf working-set`

Mode User Exec - Privilege level 15

Examples To show current members of the working-set, use the command:

```
ATMF_NETWORK[6]# show atmf working-set
```

Figure 1-18: Sample output from the show atmf working-set command.

```
ATMF Working Set Nodes:
node1, node2, node3, node4, node5, node6
Working set contains 6 nodes
```

show running-config atmf

This command displays the running system information that is specific to AMF.

Syntax `show running-config atmf`

Mode User Exec and Global Configuration

Examples To display the current configuration of AMF, use the following commands:

```
node_1# show running-config atmf
```

Note

You can manage your show output, or make it a more selective, by using a command modifier. For information on using show-command modifiers, see **"Controlling "show" Command Output"** on page 51.

Related Commands **show running-config**
no debug all

switchport atmf-crosslink

This command configures the selected port or aggregated link to be an AMF crosslink. Running this command will automatically place the port or aggregator into trunk mode (i.e. switchport mode trunk).

The connection between two AMF masters must utilize a crosslink. Crosslinks are used to carry the AMF control information between master nodes. Multiple crosslinks can be configured between two master nodes, but only one crosslink can be active at any particular time. All other crosslinks between masters will be placed in the blocking state, in order to prevent broadcast storms.

The "no" variant of this command removes any crosslink that may exist for the selected port or aggregated link.

Syntax

```
switchport atmf-crosslink
no switchport atmf-crosslink
```

Parameter	Description
`switchport`	The Layer 2 Interface
`atmf-crosslink`	Sets the switchport to be an AMF crosslink.

Mode Interface

Usage Crosslinks can be used anywhere within an AMF network. They have the effect of separating the AMF network into separate domains.

Where this command is used, it is also good practice to use the **switchport trunk native vlan** command with its parameter "**none**" selected. This is to prevent a network storm on a topology of ring connected switches.

Example-1 To make a switchport 1.0.1 an AMF crosslink, use the following commands:

```
Node_1# configure terminal
Node_1(config)# int port 1.0.1
Node_1(config-if)# switchport atmf-crosslink
```

Example-2 This example is shown twice. Example 2A is the most basic command sequence. Example 2B is a good practice equivalent that avoids problems such as broadcast storms that can otherwise occur.

Example-2A To make static aggregator sa1 an AMF crosslink, use the following commands:

```
Node_1# configure terminal
Node_1(config)# int sa1
Node_1(config-if)# switchport atmf-crosslink
```

Example-2B To make static aggregator sa1 an AMF crosslink, use the following commands for good practice:

```
Node_1# configure terminal
Node_1(config)# int sa1
Node_1(config-if)# switchport atmf-crosslink
Node_1(config-if)# switchport trunk allowed vlan add 2
Node_1(config-if)# switchport trunk native vlan none
```

In this example VLAN 2 is assigned to the static aggregator, and the native VLAN (VLAN 1) is explicitly excluded from the aggregated ports and the crosslink assigned to it.

Note that the AMF management and domain VLANs are automatically added to the aggregator and the crosslink.

Related Commands **show atmf links statistics**

switchport atmf-link

This command enables you to configure a port or aggregator to be an AMF uplink/downlink. Running this command will automatically place the port or aggregator into trunk mode.

The “no” variant of this command removes any AMF-link that may exist for the selected port or aggregated link.

Syntax

```
switchport atmf-link

no switchport atmf-link
```

Parameter	Description
`switchport`	The Layer 2 Interface
`atmf-link`	Sets the switchport to be an AMF link.

Mode Interface

Example To make a switchport 1.0.1 an ATMF crosslink, use the following commands

```
Node_1# configure terminal
Node_1(config)# int port 1.0.1
Node_1(config-if)# switchport atmf-link
```

type atmf node

This command configures a trigger to be activated at an AMF node join or leave event.

Syntax `type atmf node {join|leave}`

Parameter	Description
`type`	Configure a particular type of trigger
`atmf`	Manage AMF feature
`join`	AMF node join event
`leave`	AMF node leave event

Mode User Exec - Privilege level 15

Example-1 To configure trigger 5 to activate at an AMF node leave event, use the following commands. In this example the command is entered on node-1:

```
node1(config)# trigger 5
node1(config-trigger) type atmf node leave
```

Example-2 The following commands will configure trigger 5 to activate if an AMF node join event occurs on any node within the working set:

```
node1# atmf working-set group all
```

This command returns the following display:

```
====================
node1, node2, node3:
====================

Working set join
```

Note that the running the above command changes the prompt from the name of the local node, to the name of the AMF-Network followed, in square brackets, by the number of member nodes in the working set.

```
AMF-Net[3]# conf t
AMF-Net[3](config)# trigger 5
AMF-Net[3](config-trigger)# description description "E-mail on
                            AMF Exit"
AMF-Net[3](config-trigger)# type atmf node leave
AMF-Net[3](config-trigger)# active
```

Enter the name of the script to run at the trigger event.

```
AMF-Net[3](config-trigger)# script 1 email_me.scp
AMF-Net[3](config-trigger)# end
```

Display the trigger configurations

```
AMF-Net[3]# show trigger
```

This command returns the following display:

```
=======
node1:
========

TR# Type & Details     Description          Ac Te Tr Repeat     #Scr Days/Date
-------------------------------------------------------------------------------
001 Periodic (2 min)   Periodic Status Chk  Y  N  Y Continuous  1    smtwtfs
005 ATMF node (leave)  E-mail on ATMF Exit  Y  N  Y Continuous  1    smtwtfs
-------------------------------------------------------------------------------
```

```
==============
Node2, Node3,
==============

TR# Type & Details     Description          Ac Te Tr Repeat     #Scr Days/Date
-------------------------------------------------------------------------------
005 ATMF node (leave)  E-mail on ATMF Exit  Y  N  Y Continuous  1    smtwtfs
-------------------------------------------------------------------------------
```

Display the triggers configured on each of the nodes in the AMF Network.

```
AMF-Net[3]# show running-config trigger
```

This command returns the following display:

```
========
Node1:
========

trigger 1
 type periodic 2
 script 1 atmf.scp
trigger 5
 type atmf node leave
description "E-mail on ATMF Exit"
 script 1 email_me.scp
!
```

```
============
Node2, Node3:
============

trigger 5
 type atmf node leave
description "E-mail on ATMF Exit"
 script 1 email_me.scp
!
```

undebug atmf

This command is an alias for the **no** variant of the **debug atmf** command on page 78.